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GEOMETRY

CGL 2018

Q.1 In ΔABC, F and E are the points on sides AB and AC respectively, such that FE || BC and FE divides the triangle in two parts of equal area. If AD ⊥ BC and AD intersect FE at G, then GD: AG =?
(a) (√2 – 1) : 1 (b)(√2 + 1) : 1 (c)√2 : 1 (d)2√2 : 1

Q.2 In a circle of radius 10 cm, with center O, PQ and PR are two chords each of length 12 cm. PO intersects chord QR at the points S. The length of OS is:
(a)2.5 cm (b)3 cm (c)2.8 cm (d)3.2 cm

Q3. In ΔABC, AD ⊥ BC and BE ⊥AC, AD and BE intersect each other at F. If BF = AC, then the measure of ∠ABC is:
(a)60° (b)68° (c)45° (d)72°

Q.4 AB and CD are two parallel chords of a circle such that AB = 6 cm and CD = 2AB. Both chords are on the same side of the center of the circle. If the distance between is equal to one-fourth of the length of CD, then the radius of the circle is
(a)4√3 (b)5√3 (c)3√5 (d)4√5

Q.5 ABCD is a cyclic quadrilateral whose diagonals intersect at P. If AB=BC, ∠DBC= 70°and ∠BAC= 30°, then the measure of ∠PCD is:
(a)55° (b)30° (c)35° (d)50°

Q.6 ABCD is a trapezium in which AB parallel to DC and its diagonals intersect at P. If AP = (3x – 1) cm, PC = (5x – 3) cm, BP = (2x + 1) cm and PD = (6x – 5) cm, then the length of DB is:
(a)10 cm (b)16 cm (c)14 cm (d)12 cm

Q.7 In ΔABC with sides 6 cm, 7 cm, and 8 cm, the angle bisector of the largest angle divides the opposite side into two segments. What is the length of the shorter segment?
(a)56/13 cm (b)48/13 cm (c)24/5 cm (d)21/5 cm

Q.8 The vertices of ΔPQR lie on a circle with center O. SR is a tangent to the circle at the point R. If QR bisects the ∠ORS, then what is the measure of ∠RPQ?
(a)45° (b)30° (c)60° (d)40°

Q.9 In a circle with center O, ACBO is a parallelogram where C is a point on the minor arc AB. What is the measure of ∠AOB?
(a)120° (b)110° (c)150° (d)100°

Q.10 AB is a diameter of a circle with center O. CB is a tangent to the circle at B. AC intersects the circle at G. If the radius of the circle is 6 cm and AG = 8 cm, then the length of BC is:
(a)6√5 (b)2√6 (c)2√5 (d)6√6

Q.11 In a circle with center O, PQR is a tangent at the point Q on it. AB is a chord in the circle parallel to the tangent such that ∠BQR = 70°. What is the measure of ∠AQB?
(a)35° (b)60° (c)55° (d)40°

Q.12 In ΔADC, E and B are the points on the sides AD and AC respectively such that ∠ABE = ∠ADC. If AE = 6 cm, BC = 2 cm, BE = 3 cm and CD = 5cm, then (AB + DE) is:
(a)49/3 cm (b)46/3 cm (c)14 cm (d)16 cm

Q.13 Let O be the center of a circle and AC be its diameter. BD is a ch3ord intersecting AC at E. Point A is joined at B and D. If ∠BOC = 50°and ∠ AOD = 110°, then ∠BEC = ?
(a)70° (b)90° (c)80° (d)55°

Q.14 In a circle with center O, AB is the diameter and CD is a chord such that ABCD is a trapezium. If ∠BAC = 40°, then ∠CAD is equal to :
(a)10° (b)20° (c)50° (d)15°

Q.15 In a ΔABC, the sides are AB = 16 cm, AC = 63 cm BC = 65 cm. From A, a straight-line AM is drawn up to the midpoint M of side BC. Then the length of AM is equal to:
(a)31.5 cm (b)24.5 cm (c)23.5 cm (d)32.5 cm

CHSL 2018

Q.16 In a circle with center O, AD is a diameter and AC is a chord. point B on AC, such that OB = 5 cm and ∠OBA = 60°. If ∠DOC = 60°, then what is the length of BC?
(a)5√3 cm (b)3√5 cm (c)5 cm (d)4 cm

Q.17 Tangent AB and AC are drawn to a circle from a point A, such that, ∠BAC = 40°. A chord CP is drawn parallel to BA. The measure of ∠CBP is:
(a)35° (b)45° (c)40° (d)55°

Q.18 O is the center of a circle to which PAX and PBY are tangent from a point P at point A and B. Q is a point on the circle, such that ∠QAX = 49° and ∠QBY = 62°. What is the measure of ∠AQB?
(a)69° (b)59° (c)63° (d)67°

Q.19 In a circle with center O, diameter AB and chord CD intersect each other at E, AC and AD are joined. If ∠BOC = 48° and ∠AOD = 100°, then what is the measure of ∠CEB?
(a)78° (b)74° (c)82° (d)72°

Q.20 In a circle with center O, AB is a diameter. Points C, D and E are on the circle on one side of AB such that ABEDC is a pentagon. The sum of angles ACD and DEB is:
(a)180° (b)270° (c)225° (d)240°

Q.21 ABC is a triangle, where ∠B is obtuse. AD is perpendicular on CB produced at D. If AB = 8 cm, BC = 7 cm and BD = 4 cm, then AC=?
(a)15 cm (b)13 cm (c)12 cm (d)14 cm

Q.22 There is a polygon of 11 sides. How many triangles can be drawn by only using the vertices of the polygon?
(a)175 (b)150 (c)180 (d)165

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Q.23 Side AB of a triangle ABC is 80 cm long, whose perimeter is 170 cm. If angle ABC = 60°, the shortest side of the triangle ABC measures _____ cm.
(a)25 (b)15 (c)21 (d)17

Q.24 A unique circle can always be drawn through x number of given non-collinear points, then x must be:
(a)4 (b)3 (c)1 (d)2

Q.25 A triangle ABC is inscribed in a circle with center O. AO is produced to meet the circle at K and AD ⊥ BC. If ∠B = 80° and ∠C = 64°, then the measure of ∠DAK is:
(a)12° (b)16° (c)20° (d)10°

Q.26 In a circle with center O, ABDC is a cyclic quadrilateral with AB as a diameter of the circle. AC and BD produced meet at E. If ∠CED = 70°, then what is the measure of ∠COD?
(a)30° (b)60° (c)40° (d)45°

Q.27 The point A of a triangle ABC moves parallel to the straight-line BC. Which one among the following also moves along a straight line parallel to BC?
(a)Incenter (b)Centroid
(c)Orthocenter (d)Circumcenter

Q.28 A regular hexagon is inscribed in a circle. What is the ratio of the area of the circle to that of its portion not covered by the hexagon?
(a)$\frac{2\pi}{\sqrt{3}}$ (b)$\frac{\pi}{\pi-3\sqrt{3}}$ (c)$\frac{\pi}{\sqrt{3}}$ (d)$\frac{2\pi}{2\pi-3\sqrt{3}}$

Q.29 Two circles of diameter 4.8 cm and 8 cm are such that the distance between their centers is 6.5 cm. What is the length of a common tangent to the circles that does not intersect the line joining the center?
(a)6.1 cm (b)6.2 cm (c)6 cm (d)6.3 cm

Q.30 In a ΔABC, AD is perpendicular to BC from A, if ∠BAC = 90°, then $AB^2 : AC^2$ is equal to :
(a)$CD^2 : BD^2$ (b)CD : BD (c)BD : CD (d)$BD^2 : CD^2$

Q.31 Equilateral triangle are drawn on the hypotenuse and one of the perpendicular sides of a right-angled isosceles triangles. Their areas are H and A respectively. A/H is equal to:
(a)1/√2 (b)1/2 (c)$\frac{1}{2\sqrt{2}}$ (d)1/4

Q.32 It is given that the area of a triangle is A. The values of its perimeter, inradius, circumradius and the average of the length of the medians are respectively, p, r, R and d. The ratio A : p is equal to :
(a)r : 1 (b)r : 2 (c)$(R-r)^2 : r$ (d)$(R+r)^2 : d$

Q.33 The area of a sector of a circle with central angle 60° is A. The circumference of the circle is C. Then A is equal to:
(a)$\frac{c^2}{4\pi}$ (b)$\frac{c^2}{24\pi}$ (c)$\frac{c^2}{18\pi}$ (d)$\frac{c^2}{6\pi}$

Q.34 The perimeter of ΔABC is 24 cm and its side, BC = 9 cm. AD is the bisector of ∠BAC, while I is the Incenter AI : ID is equal to:
(a)3:2 (b)5:2 (c)5:3 (d)7:5

Q.35 In ΔABC, ∠ABC = 90° and BD ⊥ AC. If AD = 4 cm and CD = 9 cm, then BD is equal to :
(a)3√2 cm (b)3√5 cm (c)4√5 cm (d)2√5 cm

Q.36 A quadrilateral ABCD is inscribed in a circle with center O. if ∠BOC = 92° and ∠ADC = 112°, then ∠ABO is equal to :
(a)28° (b)24° (c)26° (d)22°

Q.37 OABC is a quadrilateral, where O is the center of a circle and A, B, C are points in the circle, such that ∠ABC = 120°. What is the ratio of the measure of ∠AOC to that of ∠OAC?
(a)2:1 (b)4:1 (c)3:2 (d)3:1

Q.38 In a stadium an athlete is running on a circular path with uniform speed during a practice session. The angle covered by him during one second is found to be 10° by a coach observing him from the center of the circular track. What would be the measure of angle (in degrees) described by the athlete by an observer standing on the circle?
(a)10
(b)It depends on the exact position of the observer on the circle
(c)20 (d)5

Q.39 In ΔABC, AD is median and G is the point on AD such that AG : GD = 2 : 1, then ar(ΔBDG) : ar(ΔABC) is equal to :
(a)1:6 (b)1:4 (c)1:3 (d)1:5

Q.40 In a ΔABC, D and E are two points on the sides AB and BC, respectively such that AD : DB = 2 : 3 and DE ∥ AC. If the area of ΔADE is equal to 18 cm^2, then what is the area (In cm^2) of ΔABC?
(a)54 (b)75 (c)45 (d)40.5

Q.41 Which of the following has the maximum number of vertex?
(a)Hexagonal pyramid (b)Triangular prism
(c)Tetrahedron (d)Cuboid

CGL TIER II 2018

Q.42 A circle is inscribed in ΔABC, touching AB, BC and AC at points P, Q and R respectively. If AB – BC = 4 cm, AB – AC = 2 cm and the perimeter of ΔABC = 32 cm, then PB + AR is equal to :
(a)$\frac{33}{5}$ cm (b)13 cm (c)$\frac{38}{3}$ cm (d)12 cm

Q.43 In ΔABC, AB = AC and D is a point on BC. If BD = 5 cm, AB = 12 cm and AD = 8 cm, then the length of CD is:
(a)16 cm (b)16.2 cm (c)14 cm (d)14.8 cm

Q.44 A circle touches the side BC of ΔABC at D and AB and AC are produced to E and F respectively. If AB = 10 cm, AC = 8.6 cm and BC = 6.4 cm, then BE is equal to:
(a)2.2 cm (b)3.5 cm (c)2.5 cm (d)3.2 cm

Q.45 If in ΔPQR, ∠P = 120°, PS ⊥ QR at S and PQ + QS = SR, then the measure of ∠Q is:
(a)40° (b)50° (c)30° (d)20°

Q.46 PQRS is a rectangle. T is a point on PQ such that RTQ is an isosceles triangle and PT = 5QT. If the area of the triangle RTQ is 12√3 cm^2, then the area of rectangle PQRS is :

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(a)$144\sqrt{3}$ cm² (b)$134\sqrt{3}$ cm² (c)142 cm² (d)$142\sqrt{3}$ cm²

CPO 2019

Q.47 If ΔABC is a equilateral triangle in which D, E and F are the points on sides BC, AC and AB respectively such that AD ⊥ BC, BE ⊥ AC and CF ⊥ AB. which of the following is true?
(a)$4AC^2 = 5BE^2$ (b)$2AB^2 = 3AD^2$
(c)$3AC^2 = 4BE^2$ (d)$7AB^2 = 9AD^2$

Q.48 PT is a tangent at the point R on a circle with center O. SQ is a diameter. Which when produced meets the tangent PT at P. if ∠SPT = 32°, then what will be the measure of ∠QRP?
(a)39° (b)58° (c)29° (d)32°

Q.49 Two circles of radii 5 cm and 3 cm intersect each other at A and B, and the distance between their center is 6 cm. The length (in cm) of common chord AB is:
(a)$\frac{2\sqrt{13}}{3}$ (b)$\frac{4\sqrt{14}}{3}$ (c)$\frac{2\sqrt{14}}{3}$ (d)$\frac{4\sqrt{13}}{3}$

Q.50 In ΔABC, AB = c cm, AC = b cm and CB = a cm, if ∠A = 2∠B, then which of the following is true?
(a)$a^2 = b^2 + bc$ (b)$a^2 = b^2 - ac$ (c)$a^2 = b^2 + ac$ (d)$a^2 = b^2 - bc$

Q.51 ABCD is cyclic quadrilateral, sides AB and DC, when produced, meet at E, and sides BC and AD, when produced, meet at F. If ∠BFA = 60° and ∠AED 30°, then the measure of ∠ABC is :
(a)70° (b)75° (c)80° (d)65°

Q.52 ABCD is a cyclic quadrilateral in which AB = 15 cm, BC = 12 cm and CD = 10 cm. If AC bisects BD, then what is the measure of AD?
(a)18 cm (b)13.5 cm (c)20 cm (d)15 cm

Q.53 In ΔABC, ∠C = 90°, M and N are the mid-points of the sides AB and AC respectively. CM and BN intersect each other at D and ∠BDC = 90°. If BC = 8 cm, then the length of BN is :
(a)$4\sqrt{6}$ cm (b)$6\sqrt{6}$ cm (c)$8\sqrt{3}$ cm (d)$6\sqrt{3}$ cm

Q.54 ABCD is a cyclic quadrilateral. From a point P outside the circle, two tangent PA and PC are drawn on the circle. If ∠ABC = 98°, then what is the measure of ∠APC?
(a)16° (b)22° (c)26° (d)14°

Q.55 In ΔABC, AB = AC and D is a point on side AC such that BD = BC. If AB = 12.5 cm and BC = 5 cm, then what is the measure of DC?
(a)1.8 cm (b)3 cm (c)2 cm (d)2.5 cm

CGL 2019

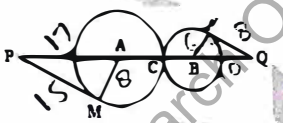
Q.56 In ΔABC, AB = AC. A circle drawn through B touches AC at D and intersects AB at P. If D is the mid-point of AC and AP = 2.5 cm, then AB is equal to:
(a)12.5 cm (b)7.5 cm (c)10 cm (d)9 cm

Q.57 PRT is a tangent to a circle with center O, at the point R on it. Diameter SQ of the circle is produced to meet the tangent at P and QR is joined. If ∠QRP = 28°, then the measure of ∠SPR is :
(a)62° (b)34° (c)32° (d)29°

Q.58 Two chords AB and CD of a circle with center O intersect each other at P. If ∠APC = 95° and ∠AOD = 110°, then what ∠BOC is:
(a)60° (b)70° (c)55° (d)65°

Q.59 In ΔABC, ∠B = 90°. If points D and E are on side BC such that BD = DE = EC, then which of the following is true?
(a)$5AE^2 = 2AC^2 + 3AD^2$ (b)$8AE^2 = 5AC^2 + 3AD^2$
(c)$5AE^2 = 3AC^2 + 2AD^2$ (d)$8AE^2 = 3AC^2 + 5AD^2$

Q.60 In the given figure, MP is the tangent to a circle with center A and NQ is a tangent to a circle with center B. If MP = 15 cm, NQ = 8 cm, PA = 17 cm and BQ = 10 cm, then AB is :
(a)23 (b)28 (c)13.5 (d)14

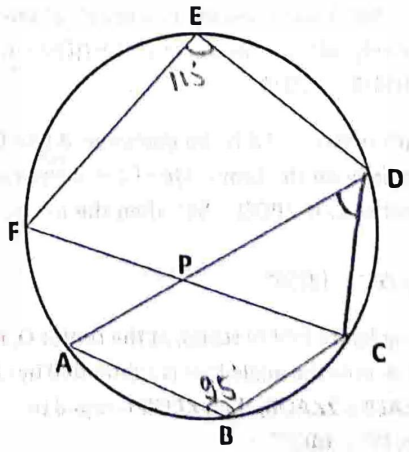


Q.61 PAQ is a tangent to a circle with center O, at a point A on it. AB is a chord such that ∠BAQ = x°(x<90). C is a point on the major arc AB such that ∠ACB = y°. If ∠ABO = 32°, then the value of x + y is:
(a)110 (b)112 (c)116 (d)98

Q.62 M is the circumcenter of ΔABC with circumradius 15 cm. Let BC = 24 cm and ML is perpendicular to BC. Then the length of ML is:
(a)10 cm (b)12 cm (c)8 cm (d)9 cm

CHSL 2019

Q.63 In the following figure, if angles ∠ABC = 95°, ∠FED = 115° (not to scale). Then the angle ∠APC is equal to:
(a)135° (b)150° (c)155° (d)120°



Q.64 In the following figure (not to scale), ∠DAB + ∠CBA = 90°, BC = AD, AB = 20 cm ,CD = 10 cm, then the area of the quadrilateral ABCD is:
(a)100 cm² (b)150 cm² (c)75 cm² (d)120 cm²

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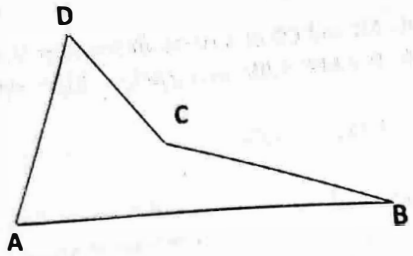
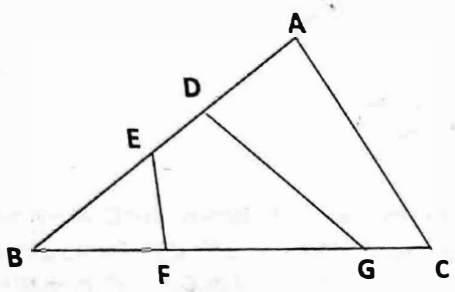


Q.65 In the given figure, if AD = 3, DE = 4, AB = 12, BF = 2, FG = 6, BC = 10. M is the area of the quadrilateral FGDE and N is the area of the triangle ABC, Then the value of M/N is:
(a)25/49 (b)1/2 (c)1/3 (d)31/60



CGL TIER II 2019

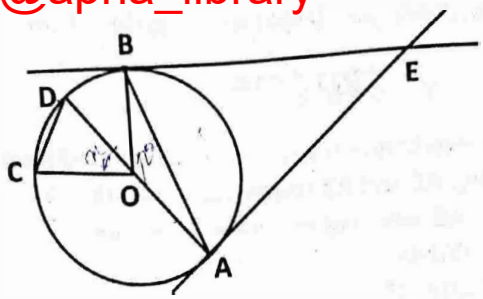
Q.66 In ΔABC, D and E are the midpoints of sides BC and AC respectively. AD and BE intersect at G at right angle. If AD = 18 cm and BE = 12 cm then the length of DC(in cm) is:
(a)8 (b)10 (c)9 (d)6

Q.67 Let D and E be two points on the side BC of ΔABC such that AD = AE and ∠BAD = ∠EAC. If AB = (3x + 1) cm, BD = 9 cm, AC = 34 cm and EC = (y + 1) cm, then the value of (x + y) is:
(a)19 (b)20 (c)16 (d)17

Q.68 In ΔPQR, ∠P = 90°, S and T are the mid points of the sides PR and PQ respectively. What is the value of $RQ^2/(QS^2 + RT^2)$?
(a)2/3 (b)1/2 (c)4/5 (d)3/4

Q.69 In a circle with center O, AB is the diameter. P and Q are two points on the circle on the same side of the diameter AB, AQ and BP intersect at C. If ∠POQ = 54°, then the measure of ∠PCA is:
(a)72° (b)63° (c)56° (d)54°

Q.70 In the following figure (not in scale), at the center O, if the chord AB subtends double the angle that is subtended by chord CD and the angle ∠AEB = 2∠AOB, then ∠COD is equal to:
(a)60° (b)45° (c)75° (d)30°



CGL PRE 2020

Q.71 In a triangle ABC, AB : AC = 5 : 2, BC = 9 cm, BA is produced to D, and the bisector of the angle CAD meets BC produced to E. What is the length (in cm) of CE?
(a)9 (b)10 (c)6 (d)3

Q.72 In a circle with center O, AD is a diameter and AC is a chord. Point B is on AC such that OB = 7 cm and ∠OBA = 60°. If ∠DOC = 60°, then what is the length of BC (in cm)?
(a)7 (b)9 (c)5 (d)3.5

Q.73 The radii of two concentric circles are 12 cm and 13 cm. AB is a diameter of the bigger circle. BD is a tangent to a smaller circle touching it at D. Find the length (in cm) of AD? (Correct to one decimal place)
(a)24.5 (b)23.5 (c)25.5 (d)17.6

Q.74 In a circle with center O, AB is a diameter and CD is a chord such that ∠ABC = 34° and CD = BD. What is the measure of ∠DBC?
(a)30° (b)24° (c)32° (d)28°

Q.75 What is the area (in cm^2) of a circle inscribed in a square of area 784 cm^2? (Take $\pi = \frac{22}{7}$)
(a)660 (b)616 (c)924 (d)462

Q.76 Points P, Q, R, S and T lie in this order on a circle with center O. If chord TS is parallel to diameter PR and ∠RQT = 58°, then find the measure (in degrees) of ∠RTS.
(a)58 (b)29 (c)45 (d)32

Q.77 From a nexternal point A, two tangents AB and AC have been drawn to a circle touching the circle at B and C respectively. P and Q are points on AB and AC respectively such that PQ touches the circle at R. If AB = 11 cm, AP = 7 cm and AQ = 9 cm, then find the length of PQ (in cm).
(a)8 (b)7 (c)5 (d)6

Q.78 ABC is a right-angled triangle, right-angled at B. D is a point on AC such that AD = 12 cm and CD = 16 cm. If BD bisects ∠ABC, then the perimeter of ΔABC will be:
(a)66 cm (b)56.2 cm (c)66.2 cm (d)67.2 cm

Q.79 In ΔABC, D is the mid-point of side AC and E is a point on side AB such that EC bisects BD at F. If AE = 30 cm, then the length of EB is:
(a)10 cm (b)20 cm (c)15 cm (d)18 cm

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Q.80 In a triangle ABC, D is a point on BC such that BD : DC = 3 : 4. E is a point on AD such that AE : ED = 2 : 3. Find the ratio area (ΔECD) : area(ΔAEB).

(a)9 : 8 (b)1 : 2 (c)2 : 1 (d)8 : 9

Q.81 Points A and B are on a circle with center O. PAM and PBN are tangents to the circle at A and B respectively from a point P outside the circle. Point Q is on the major arc AB such that ∠QAM = 58° and ∠QBN = 50°, then find the measure (in degrees) Of ∠APB.

(a)30 (b)32 (c)36 (d)40

Q.82 ΔABC is an equilateral triangle. D is a point on side BC such that BD : BC = 1 : 3. If AD = 5√7 cm, then the side of the triangle is:

(a)18 cm (b)12 cm (c)20 cm (d)15 cm

Q.83 What is the length (in cm) of the smallest altitude of the triangle whose sides are 5 cm, 12 cm and 13 cm? (correct to one decimal place)

(a)5.1 (b)12.0 (c)4.6 (d)2.6

Q.84 In triangle ABC, D and E are the mid points of AB and BC respectively. If area(ΔCED) = 8 cm^2, then what is the area(ADEC) in cm^2?

(a)21 (b)32 (c)24 (d)16

Q.85 Triangle ABC and DBC are right angled triangles with common hypotenuse BC. BD and AC intersect at P when produced. If PA = 8 cm, PC = 4 cm and PD = 3.2 cm, then the length of BD, in cm, is:

(a)5.6 (b)7.2 (c)6.4 (d)6.8

Q.86 Points A, B and C are on a circle with center O such that ∠BOC = 84°. If AC is produced to a point D such that ∠BDC = 40°, then find the measure of ∠ABD(in degrees).

(a)92 (b)102 (c)56 (d)98

Q.87 In a circle with center O, points A, B, C and D in this order are concyclic such that BD is a diameter of the circle. If ∠BAC = 22°, then find the measure (in degrees) of ∠COD.

(a)158 (b)68 (c)79 (d)136

CHSL 2020

Q.88 In ΔXYZ, P is the midpoint of side XZ and Q is a point on side XY such that QZ bisects PY. If XQ = 24 cm, then what is the length (in cm) of QY?

(a)6 (b)18 (c)8 (d)12

Q.89 In an isosceles triangle ABC, AB = AC and AD is perpendicular to BC. If AD = 12 cm and the perimeter of ΔABC is 36 cm, then the length of BC (in cm) is:

(a)5 (b)12 (c)10 (d)13

Q.90 D, E and F are the feet of the perpendiculars from the vertices A, B and C respectively, of a triangle ABC. If angle BED and angle BFE (in degrees) are 24 and 110 respectively. What is the measure (in degrees) of angle EBF?

(a)55 (b)67 (c)86 (d)46

Q. 91 Chord AB of a circle with radius 5 cm is at a distance of 4 cm from the center O. If tangent drawn at A and B intersect at P, then find the length of the tangent AP.

(a)7.5 cm (b)3.75 cm (c)3 cm (d)2.4 cm

Q.92 In ΔABC, D and E are the points on the sides AB and AC, respectively such that ∠AED = ∠ABC. If AE = 6 cm, BD = 2 cm, DE = 3 cm and BC = 5 cm, then (AB + AC) is equal to:

(a)$\frac{86}{3}$ cm (b)$\frac{49}{3}$ cm (c)$\frac{50}{3}$ cm (d)$\frac{70}{3}$ cm

Q.93 A square park has been divided into two rectangles of equal area. If perimeter of each of these rectangles is 39 m, then what will be the perimeter of the square park?

(a)104 m (b)39 m (c)78 m (d)52 m

Q.94 Let O be the center of a circle and AC be the diameter. BD is a chord intersecting AC at E. AD and AB are joined. If ∠BOC = 40° and ∠AOD = 120°, then ∠BEC is equal to:

(a)55° (b)80° (c)90° (d)70°

Q.95 The length of a chord of a circle, that makes an angle of 60° with the tangent drawn at one end point of the chord is 8√3 cm, then the radius of the circle will be:

(a)8 cm (b)5 cm (c)6 cm (d)7 cm

Q.96 The sides AB, BC and AC of ΔABC are 12 cm, 8 cm and 10 cm respectively. A circle is inscribed in the triangle touching AB, BC and AC at D, E and F respectively. The ratio of the lengths of AD to CE is:

(a)5 : 7 (b)3 : 5 (c)10 : 7 (d)7 : 3

Q.97 In ΔABC, ∠A = 135°, CA = 5√2 cm and AB = 7 cm. E and F are the midpoints of sides AC and AB respectively. The length of EF (in cm) is:

(a)6.5 (b)5.5 (c)6 (d)5

Q.98 The altitude AD of triangle ABC is 9 cm. If AB = 6√3 and CD = 3√3 cm, then what will be the measure of ∠A?

(a)90° (b)30° (c)45° (d)60°

Q.99 In ΔABC, AD is a median. If points E, F and G are midpoints of AD, AE and DE respectively, then what will be the area of ΔBFG?

(a)$\frac{1}{2}(ar(\Delta ABC))$ (b)$\frac{1}{8}(ar(\Delta ABC))$

(c)$\frac{1}{4}(ar(\Delta ABC))$ (d)$\frac{1}{2}(ar(\Delta BGC))$

Q.100 a and b are the lengths of two sides of a triangle such that the product ab = 24, where a and b are Integers, then how many such triangles are possible?

(a)15 (b)12 (c)18 (d)16

Q.101 In ΔABC, DE||AB, where D and E are points on sides AC and BC, respectively. F is a point between C and D such that EF||BD. If AD = 15 cm, DC = 10 cm, then the length of CF is:

(a)3 cm (b)7.5 cm (c)5 cm (d)4 cm

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Q.102 How many isosceles triangles with integer sides are possible such that the sum of two of the sides is 16 cm?
(a)18 cm (b)15 cm (c)9 cm (d)24 cm

Q.103 In ΔABC, medians BE and CF are perpendicular to each other and intersect at M. If BE = 9 cm and CF = 13 cm, then the area of ΔABC will be:
(a)75 cm^2 (b)78 cm^2 (c)76 cm^2 (d)68 cm^2

Q.104 A and B are two points on a circle with center O. C is a point on the minor arc of the circle between points A and B. the tangents to the circle A and B meet each other at a point D. If ∠ADB = 25°, then ∠ACB (in degrees) is equal to:
(a)105 (b)100.5 (c)102.5 (d)100

Q.105 ΔPQR is inscribed in a circle. The bisector of ∠P cuts QR at S and the circle at T. If PR = 5 cm, PS = 6 cm and ST = 4 cm, then the length (in cm) of PQ is:
(a)13 (b)12 (c)10 (d)15

Q.106 In ΔABC, D and E are points on sides AB and BC respectively, such that BD : DA = 1 : 2 and CE : EB = 1 : 4. If DC and AE intersect at F, then FD : FC is equal to :
(a)3 : 2 (b)5 : 2 (c)8 : 3 (d)4 : 1

Q.107 The circumference of a circle is 'a π' units and the area of the circle is 'b π' square units. If a : b is equal to 4 : 5, then the radius of the circle is:
(a)3 cm (b)2.5 cm (c)5 cm (d)2 cm

SSC SELECTION PHASE IX

Q108. In ΔABC, $AB = 20$ cm, $BC = 7$ cm and $AC = 15$ cm. Side BC is produced to D such that $\Delta DAB \sim \Delta DCA$. The length of CD is:
(a) 12 cm (b) 10 cm (c) 9 cm (d) 8 cm

Q109. In ΔABC, the bisector of $\angle B$ meets side AC at D. if AB = 16 cm, BC = 9.6 cm and AC = 22.4 cm, then what is the length (in cm) of AD?
(a) 8.4 (b) 14 (c) 9.4 (d) 15

Q110. What is the area (in hectares) of a rhombus-shaped field whose side is 146 m one of its diagonals is 192 m?
(a) 2.102 (b) 2.121 (c) 2.012 (d) 2.112

Q111. Side BC of a ΔABC is produced to D such that CD = AC. Also, AD = BD and AB = AC. What is the measure of ∠ADB?
(a) 36° (b) 24° (c) 30° (d) 40°

Q112. In ΔABC, D and E are the points on sides AB and BC, respectively, such that DE||AC. If BD = 3 cm and AD = 4 cm, then $\frac{Area\ of\ \Delta BDE}{Area\ of\ quadrilateral\ ADEC} = \frac{p}{q}$, where p, q are coprime. What is the value of $|p - q|$?

(a) 37 (b) 31 (c) 40 (d) 33

SSC CGL PRE 2021

Q113. In ΔLMN, the bisector of ∠L and ∠N intersect at an angle of 112°. What is the measure (in degrees) of ∠M?
a) 62 b) 60 c) 44 d) 72

Q114. Two circles touch each externally at T. RS is a direct common tangent to the two circles touching the circles at P and Q. ∠TPQ = 42°, ∠PQT (in degrees) is:
a) 48 b) 45 c) 42 d) 60

Q115. In ΔABC, D is a point on side BC such that ∠ADC = ∠BAC. If CA = 12 cm, CD = 8 cm, then CB (in cm) = ?
a) 18 b) 12 c) 15 d) 10

Q116. In a circle of diameter 20 cm, chords AB and CD are parallel to each other. BC is diameter. If AB is 6 cm from the centre of the circle, what is the length (in cm) of the chord CD?
a) 8 b) 12 c) 20 d) 16

Q117. In a triangle ABC, D and E are points on BC such that AD = AE and ∠BAD = ∠CAE. If AB = (2p + 3), BD = 2p, AC = (3q − 1) and CE = q, then find the value of (p + q).
a) 3 b) 4.5 c) 3.6 d) 2

Q118. An isosceles ΔMNP is inscribed in a circle. If MN = MP = 16√5 cm, and NP = 32 cm, what is the radius (in cm) of the circle?
a) 20 b) 18√5 c) 18 d) 20√5

Q119. A circle is inscribed in ΔABC, touching AB, BC and AC at the points P, Q and R, respectively. If AB − BC = 4 cm, AB-AC = 2 cm, and the perimeter of $\Delta ABC = 32\ cm$, then AC (in cm)?
a) 35/3 b) 38/3 c) 32/3 d) 26/3

Q120. In a ΔABC, the bisector of ∠A meets BC at D. if AB = 9.6 cm, AC = 11.2 cm and BD = 4.8 cm, perimeter (in cm) of ΔABC is:
a) 30.4 b) 28.6 c) 31.2 d) 32.8

Q121. AB is a diameter of a circle with centre O. the tangent at a point C on the circle and AB, when produced, meet at the point P. if ∠APC = 38°, then what is the measure of ∠PCB?
a) 23° b) 19° c) 29° d) 26°

Q122. The circumcentre of an equilateral triangle is at a distance of 3.2 cm from the base of the triangle. What is the length (in cm) of each of its altitudes?
a) 6.4 b) 7.2 c) 12.8 d) 9.6

Q123. In ΔABC, ∠A = 66°, BD ⊥ AC and CE ⊥ AB. BD and EC Intersect at P. the bisector ∠PBC and ∠PCB meet at Q. what is the measure of ∠BQC ?
a) 147° b) 127° c) 132° d) 143°

Q124. A triangle with the lengths of its sides proportional to the numbers 7, 24 and 30 is:
a) acute angled b) not possible
c) obtuse angled d) right angled

Q125. In triangle ABC, X and Y are the points on sides AB and AC, respectively, such that XY is parallel to BC. If XY : BC = 2.5 : 7, what is the ratio of the area of the trapezium BCYX to that of the ΔAXY?

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a) $\frac{25}{196}$ b) $\frac{171}{25}$ c) $\frac{25}{171}$ d) $\frac{196}{25}$

Q126. In triangle ABC, the bisector of angle BAC meets BC at point D in such a way that AB = 10 cm, AC = 15 cm and BD = 6 cm. find the length of BC (in cm).
a) 17 b) 15 c) 11 d) 9

Q127. The radii of two concentric circles with centre O are 26 cm and 16 cm. Chord AB of the larger circle is tangent to the smaller circle at C and AD is a diameter. What is the length of CD?
a) 42 cm b) 38 cm c) 35 cm d) 36 cm

Q128. AB is the diameter of a circle with centre O. C and D are two points on the circle on either side of AB, such that ∠CAB = 52° and ∠ABD = 47°. What is the difference (in degrees) between the measures of ∠CAD and ∠CBD?
a) 10 b) 15 c) 25 d) 20

CGL TIER II 2021

Q129. AB and CD are two chords in a circle with centre O and AD is a diameter. AB and CD produced meet at a point P outside the circle. If angle APD = 25° and angle DAP = 39° , then the measure of angle CBD is:
(a) 26° (b) 27° (c) 29° (d) 32°

Q130. In ΔABC, M is the midpoint of the side AB, N is the interior of ΔABC such that CN is the bisector of angle C and CN ⊥ NB. What is the length (in cm) of MN, if BC = 10 cm and AC = 15 cm?
(a) 2 (b) 4 (c) 2.5 (d)5

Q131. A circle is inscribed in ΔPQR touching the sides QR, PR and PQ at the points S, U and T , respectively PQ = (QR + 5) cm, PQ = (PR + 2) cm. if the perimeter of ΔPQR is 32 cm, then PR is equal to:
(a) 10 cm (b) 13 cm (c) 11 cm (d) 8 cm

Q132. O is a point in the interior of ΔABC such that OA = 12 cm, OC = 9 cm, angle AOB = angle BOC =angle COA and angle ABC = 60°. What is the length (in cm) of OB?
(a) $4\sqrt{3}$ (b)$6\sqrt{3}$ (c) $4\sqrt{6}$ (d) $6\sqrt{2}$

Q133. S and T are points on the side PQ and PR, respectively, of ▲ PQR such that PS × PR = PQ × PT. If ∠Q=96° and ∠PST = ∠PRQ + 34°, then ∠QPR?
(a) 22° (b) 24° (c) 26° (d) 25°

Q134. In Δ ABC, AB=20cm, BC = 7 cm, and CA = 15 cm. Side BC is produced to D such that ΔDAB ~ Δ DCA. DC is equal to:
(a) 9 cm (b) 8 cm (c) 10 cm (d) 7 cm

Q135. $A1$ and $A2$ are two regular polygons. The sum of all the interior angles of $A1$ is 1080°. Each interior angle of $A2$ exceeds its exterior angle by 132°. The sum of the number of sides $A1$ and $A2$ is:
(a) 21 (b) 22 (c) 23 (d) 24

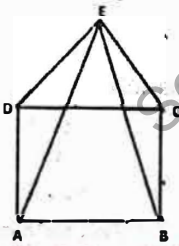
Q136. In a square ABCD, diagonals AC and BD intersect at O. The angle bisector of ∠CAB meet BD and BC at F and G, respectively. OF : CG is equal to:
(a) 1 : 2 (b) 1 : 3 (c) $1 : \sqrt{2}$ (d) $1 : \sqrt{3}$

Q137. In equilateral Δ ABC, D and E are points on the sides AB and AC, respectively, such that AD=CE. BE and CD intersect at F. The measure (in degrees) of ∠CFB is:
(a) 120° (b) 135° (c) 125° (d) 105°

Q138. In ΔPQR, PQ=PR and S is a point on QR such that ∠PSQ=96° + ∠QPS and ∠QPR=132°. What is the measure of ∠PSR?
(a) 45° (b) 56° (c) 54° (d) 52°

DELHI POLICE 22

Q139. If ABCD is a square and DEC is an equilateral triangle, then ∠DAE is:



a) 30° b) 15° c) 60° d) 45°

Q140. In an isosceles right-angled triangle, the perimeter is 49 metres. Find its area (in m²).
a) 100.98 b) 102.98 c) 103.96 d) 101.96

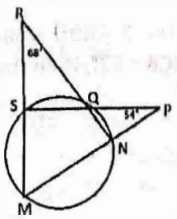
Q141. In an equilateral triangle of side 8 cm, a circle is inscribed touching its side. Find the area of the portion of the triangle NOT included in the circle (√3 = 1.732 and π = 3.14) correct to two places of decimal.
a) 11.34 cm² b) 10.44 cm² c) 13.97 cm² d) 10.97 cm²

Q142. In triangle ABC, AB = BC and D, E, F are mid-points of the sides AB, BC and AC, respectively. If DF = 5 cm, then EF is equal to:
a) 2 cm b) 3 cm c) 5 cm d) 4 cm

Q143. x, y and z are the sides of a triangle. If z is the largest side and $x^2 + y^2 > z^2$, then the triangle is a:
a) Right angled triangle b) Acute angled triangle
c) Obtuse angled triangle d) Isosceles right angled trignale

CPO22

Q144. In the given figure, MNP, SQP, NQR and MSR are straight lines. ∠NPQ = 54° and ∠QRS = 68°. What is the degree measure of ∠SMN?



a) 29° b) 38° c) 54° d) 68°

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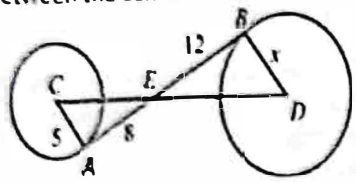
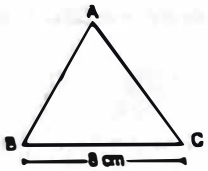
Q145. AB is a common tangent to both the circles in the given figure. Find the distance (correct to two decimal places) between the centres of the two circles.



a) 18.98 units b) 23.58 units c) 26.59 units d) 21.62 units

CGL PRE 22

Q146. In the given figure, ABC is an isosceles triangle with BC = 8 cm and AB = AC = 5 cm. the value of tan C – cot B is _____



a) $-\frac{5}{12}$ b) $-\frac{7}{12}$ c) $\frac{7}{12}$ d) $\frac{5}{12}$

Q147. Three circles of radius 7 cm are kept touching each other. The string is tightly tied around these three circles. What is the length of the string?
a) 42 + 7p cm b) 21p + 14 cm c) 42 + 14p cm d) 7 + 14p cm

Q148. In ΔABC, P and Q are points on AB and BC, respectively, such that PQ || AC. Given that AB = 26, PQ = 7 and AC = 10 find the value of AP.
a) 7.1 b) 7.8 c) 18.2 d) 16.4

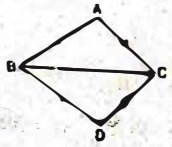
Q149. ABCD is a square and ΔMAB is an equilateral triangle. MC and MD are joined. What is the degree measure of ∠MDC?
a) 78° b) 60° c) 65° d) 75°

Q150. The mid points of AB and AC of ΔABC are X and Y, respectively. If BC + XY = 24 units, then the value of BC – XY is:
a) 5 cm b) 4 cm c) 6 cm d) 8 cm

Q151. In a ΔABC, AB = BC, and P, Q and R are the mid points of the sides AB, BC and AC, respectively. If PR = 5 cm, then find the length of QR.
a) 5 cm b) 2 cm c) 7 cm d) 4 cm

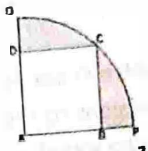
Q152. Tow circles touch each other externally at P. AB is a direct common tangent to the two circles, A and B are points of contact, and ∠PAB = 40°. The measure of ∠ABP is:
a) 45° b) 55° c) 50° d) 40°

Q153. In the given figure, AB = DB and AC = DC. If ∠ABD = 58° and ∠DBC = (2x – 4)°, ∠ACB = (y + 15)° and ∠DCB = 63°, then the value of 2x + 5y is:



a) 325 b) 273 c) 259 d) 268

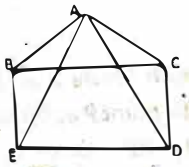
Q154. In the given figure, a square ABCD is inscribed in a quadrant APCQ. If AB = 16 cm, find the area of the shaded region (take π = 3.14) correct to two place of decimal.



a) 155.98 cm² b) 179.68 cm² c) 163.85 cm² d) 145.92 cm²

Q155. A circle is inscribed in a triangle ABC having sides AB = 16 cm, BC = 20 cm and AC= 24 cm, and side AB, BC and AC touches circle at D, E and F, respectively. The measure of AD is:
a) 10 cm b) 20 cm c) 6 cm d) 14 cm

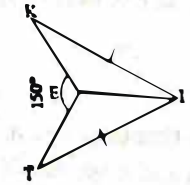
Q156. In the figure BCDE is a square and ABC is equilateral triangle then ∠ADC is:



a) 45° b) 30° c) 60° d) 15°

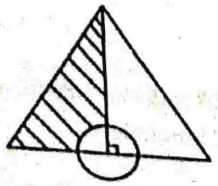
Q157. Two identical circles each of radius 30 cm intersect each other such that the circumference of each one passes through the centre of the other. What is the area of the intersecting region?
a) 400π – 250√3 cm² b) 300π – 150√3 cm²
c) 500π – 350 √3 cm² d) 600π – 450√3 cm²

Q158.



In the given figure, if KI = IT and EK = ET, then ∠TEI = _____.
a) 75° b) 125° c) 105° d) 150°

Q159. Find the area of the shaded portion of an equilateral triangle with sides 6 units shown in the following figure. A circle of radius 1 unit is centered at midpoint of a side of the triangle.



a) $\frac{1}{2}\left(9\sqrt{3}-\frac{11}{7}\right)$ unit² b) $\frac{1}{4}\left(9\sqrt{3}-\frac{11}{7}\right)$ unit²
c) $\frac{1}{2}\left(6\sqrt{3}-\frac{11}{7}\right)$ unit² d) $\frac{1}{2}\left(9\sqrt{3}-\frac{22}{7}\right)$ unit²

Q160. In a ΔXYZ, XO is the median and $XO = \frac{1}{2}YZ$. If ∠YXO = 30°, then what is the value of ∠XYZ?
a) 15° b) 90° c) 30° d) 60°

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CGL MAINS 22

Q161. A,B, C are three points such that AB = 9 cm, BC = 11 cm and AC = 20 cm. The number of circles passing through points A,B,C is:
a) 2 b) 0 c) 1 d) 3

Q162. Q5. A circle touches all four sides of a quadrilateral ABCD. If AB = 18 cm, BC = 21 cm and AD = 15 cm, then length CD is:
a) 16 cm b) 14 cm c) 12 cm d) 18 cm

Q163. If the external angle of a regular polygon is 18°, then the number of diagonals in this polygon is:
a) 180 b) 150 c) 170 d) 140

Q164. A pyramid has an equilateral triangle as its base, of which each side is 8 cm. its slant edge is 24 cm. the whole surface area of the pyramid (in cm^2) is:

a) $(16\sqrt{3}+24\sqrt{35})$ b) $(12\sqrt{3}+24\sqrt{35})$
c) $(24\sqrt{3}+36\sqrt{35})$ d) $(16\sqrt{3}+48\sqrt{35})$

CHSL PRE 22

Q165. Angle subtended by a chord xy on the centre of a circle is 180 degree. If length of this chord is 36 cm, then wha twill be the radius of this circle?
a) 18 cm b) 27 cm c) 24 cm 4) 21 cm

Q166. Sides of a triangle are 12 cm, 9 cm and 9 cm. what is the radius of the circumcircle of this triangle ?
a) $\frac{27}{\sqrt{5}}$ b) $\frac{27\sqrt{5}}{10}$ c) $\frac{54}{\sqrt{5}}$ d) $\frac{181}{\sqrt{5}}$

Q167. Three circles of radius 7 cm are placed in such a way that each circle touches the other two. What will be the area of the portion enclosed by these three circles ?
a) $49\sqrt{3}-77\ cm^2$ b) $50\sqrt{3}-66\ cm^2$
c) $40\sqrt{3}-66\ cm^2$ c) $40\sqrt{3}-77\ cm^2$

Q168. Triangle PQR is a right – angled triangle. Angle PQR = 90 degree and QS ⊥ PR. If PQ = 6 cm and PS = 4 cm, then find the length of QS.
a) $2\sqrt{5}$ cm b) 3 cm c) 6 cm d) 5 cm

Q169. In triangle STU, SX is the medlan on TU. If SX = TX, then what is the value of angle TSU ?
a) 90 degree b) 60 degree
c) 75 degree d) 45 degree

Q170. An incircle with center O is drawn inside an equilateral triangle ABC and the length of the side is 12 cm. find the area (in sq. cm) of the triangle which is not in the incircle.
a) 21.48 b) 30.64
c) 37.71 d) 24.64

Q171. Triangle ABC is a right angled triangle. Angle A = 90 degree, AB = 4 cm, BC = 5 cm. What is the value of cosB + cotC ?
a) 17/20 b) 29/20 c) 23/20 d) 31/20

Q172. Radius of incircle of an equilateral is $9\sqrt{3}$. What will be the perimeter of this equilateral triangle?
a) 81 cm b) 162 cm c) 54 cm d) 108 cm

Q173. Two circles of radius of 21 cm each intersect each other such that each passes through the centre of the other. What is the length of the common chord ?
a) 21√3 cm b) 27 cm
c) 42 cm d) 18√3 cm

Q174. In a triangle MNO, XA, XB and XC are perpendicular bisectors on sides MN, ON and OM respectively intersect each other at X. If ∠NMO = 55 degree, then what is the value of ∠NXO?
a) 110 degree b) 125 degree
c) 95 degree d) 130 degree

Q175. In triangle XYZ, points P, Q and R are points on the sides XY, YZ and XZ respectively ∠YXZ = 50 degree, XR = PR, ZR = QR and ∠RQZ = 80 degree. What is the value of ∠PRQ ?
a) 60 degree b) 80 degree
c) 75 degree d) 90 degree

Q176. The radii of two concentric circles are 34 cm and 50 cm. A and D are the points on larger circle and B and C are points on smaller circle. If ABCD is a straight line and BC = 32 cm, then what is the length of AD?
a) 60 cm b) 40 cm
c) 80 cm d) 75 cm

Q177. Angle subtended by a chord OP on the circumference of a circle is 90 degree. If diameter of the circle is 44 cm then what will be the length of chord OP?
a) 88 cm b) 22 cm c) 44 cm d) 66 cm

Q178. Two medians DM and EN of ΔDEF intersect each other at G at right angle. If EF = 20 cm and EN = 12 cm, then what is the length of DM?
a) 12 cm b) 20 cm c) 18 cm d) 15 cm

Q179. In a cyclic quadrilateral MNOP, ∠M is opposite to ∠O, If 2 ∠O = 3 ∠M, then what is the value of ∠M?
a) 108 degree b) 88 degree
c) 96 degree d) 72 degree

Q180. If in triangle ABC, MN is parallel to BC, and M and N are points on AB and AC respectively. The area of quadrilateral MBCN = 130 cm^2. If AN : NC = 4 : 5, then the area of Triangle MAN is:
a) 65 cm^2 b) 45 cm^2
c) 32 cm^2 d) 40 cm^2

Q181. Two medians NA and OB of triangle NOP intersect each other at S at right angles. If NA = 15 cm and OB = 15 cm, then what is the length of OA?

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a) 5√5 cm b) 7√5 cm c) 6√5 cm d) 3√5 cm

Q182. Two medians JX and KY of triangle JKL intersect each other at Z at right angles. If KL = 22 cm and KY = 12 cm, then what is the length of JX?
a) $6\sqrt{19}$ cm b) $3\sqrt{57}$ cm
c) $2\sqrt{57}$ cm d) $4\sqrt{19}$ cm

Q183. Two medians QT and RS of the triangle PQR intersect at G at right angles. If QT = 18 cm and RS = 27 cm, then the length of QS is:
a) 10 cm b) 15 cm
c) 13 cm d) 20 cm

Q184. Triangle ABC is similar to triangle PQR, AB = 4 cm, BC = 8 cm, and AC = 10 cm. If QR = 16 cm, then what is the area of triangle PQR?
a) $8\sqrt{462}$ cm² b) $2\sqrt{231}$ cm²
c) $4\sqrt{231}$ cm² d) $4\sqrt{462}$ cm²

Q185. Two circles intersect each other such that each passes through the centre of other. Radius of these circles are equal. If the length of common chord is 14√3 cm, then what will be the sum of circumferences of these two circles ?
a) 188 cm b) 176 cm
c) 88 cm d) 352 cm

Q186. In triangle PQR, ∠Q = 90 degrees and QX is perpendicular to PR. If PQ = 15 cm and PR = 25 cm, then what is the ratio of PX : XR ?
a) 2 : 3 b) 9 : 16
c) 7 : 18 d) 1 : 4

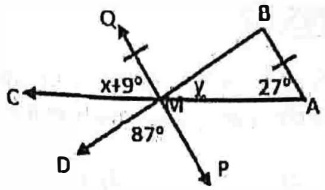
Q187. Sides of a triangle are 9 cm, 6 cm and 5 cm. What is the value of circumradius of this triangle?
a) $\frac{27\sqrt{2}}{8}$ cm b) $\frac{9\sqrt{2}}{5}$ cm
c) $\frac{9\sqrt{3}}{5}$ cm d) $\frac{9\sqrt{3}}{4}$ cm

ICAR & Selection Phase XI

Q188. In triangle ABC, D and E are the points on side AB and BC, respectively, such that DE || AC and the ratio of BD and AD is 2 : 5. If the area of triangle BED is k% less, then the area of quadrilateral ACED, then the value of k is closest to:
1. 90.8 2. 90.2 3. 88.8 4. 91.1

Q189. In a circle, AB is diameter and PC is a tangent at point C on the circle where P is a point outside the circle. BA produced meets the tangent PC at P. If ∠APC = 29°, then what is the measure (in degrees) of ∠ACP?
1. 31 2. 30.5 3. 30 4. 31.5

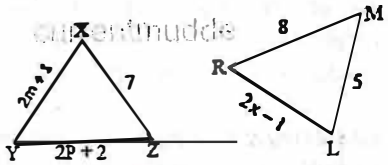
Q190. In the figure given below, AB ∥ $\overleftrightarrow{PQ}$. What is the value of $y - 2x$?
नीचे दिए गए चित्र में, AB ∥ $\overleftrightarrow{PQ}$, $y - 2x$ का मान क्या है?



1. 50° 2. 60° 3. 30° 4. 40°

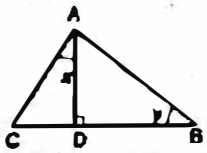
CGL PRE 23

Q191. If triangle XYZ≅ triangle LMR, then the value of $m + x + p$?



1. 9 2. 13 3. 6 4. 7

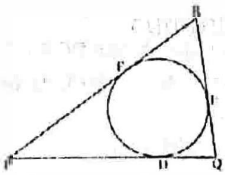
Q192. In the given figure, if AD ⊥ BC, AC = 26 units, CD = 10 units, BC = 42 units, ∠DAC = x and ∠B = y, then the value of $\frac{6}{\cos x} - \frac{5}{\cos y} + 8\tan y$ is:



1. $\frac{13}{6}$ 2. $\frac{15}{7}$ 3. $\frac{16}{9}$ 4. $\frac{25}{4}$

Q193. D and E are points on the sides AB and AC, respectively, of triangle ABC such that DE is parallel to BC and AD : DB = 7 : 9. If CD and BE intersect each other at F, then find the ratio of areas of triangle DEF and triangle CBF.
1. 49 : 144 2. 49 : 81
3. 49 : 256 4. 256 : 49

Q194. In the given figure, a circle is inscribed in triangle PQR, such that it touches the sides PQ, QR and RP at points D, E, F respectively. If the length of the sides PQ = 18 cm, QR = 13 cm and RP = 15 cm, then find the length of PD?



1. 10 cm 2. 8 cm
3. 15 cm 4. 12 cm

Q195. Which of the following sets of lengths (in cm) will give three sides of an obtuse-angled triangle?
1. 15, 62, 64 2. 17, 64, 66
3. 16, 63, 65 4. 18, 65, 67

Q196. ABC is a triangle and D is a point on the side BC. If BC = 16 cm, BD = 11 cm and ∠ADC = ∠BAC, then the length of AC is equal to:
1. 4√5 cm 2. 4 cm
3. 3√5 cm 4. 5 cm

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CHSL PRE 23

Q197. Two circles with centres A and B touch each externally, PQ is a direct common tangent which touches the circle at P and Q. If the radii of the circles 9 cm and 4 cm, respectively, then the length of PQ (in cm) is equal to:
1. 6.5 2. 12 3. 13 4. 5

Q198. AB and BC are two chords of a circle with centre O. Both chords are on either side of the centre O. Point A and point C are connected to the centre O, such that ∠BAO = 36° and ∠BCO = 48°. What is the degree measure of the angle subtended by the minor arc AC at the centre O?
1. 120° 2. 144° 3. 136° 4. 168°

Q199. If the radii of two circles are 7 cm and 4 cm and the length of the transverse common tangent is 13 cm, then the distance between the two centres is:
1. $\sqrt{128}$ cm 2. $\sqrt{290}$ cm 3. $\sqrt{290}$ cm 4. $\sqrt{240}$ cm

Q200. It is given that $\Delta PQR \cong \Delta MNY$ and PQ = 8 cm, ∠Q = 55° and ∠P = 72°. Which of the following is true?
1. NM = 8 cm, ∠Y = 53° 2. NY = 8 cm, ∠Y = 72°
3. NM = 8 cm, ∠M = 53° 4. NY = 8 cm, ∠N = 55°

Q201. In ΔXYZ, L and M are the middle points of the sides XY and YZ, respectively. N is a point on the segment LM such that LN : NM = 1 : 2. If LN = 5 cm, then YZ is equal to:
1. 26 cm 2. 24 cm 3. 28 cm 4. 30 cm

Q202. A triangle PQR has three sides equal in measurement and if PM is perpendicular to QR, then which of following equality holds?
1. $3PQ^2 = 4PM^2$ 2. $3PQ^2 = 2PM^2$
3. $3PM^2 = 2PQ^2$ 4. $3PM^2 = 4PQ^2$

Q203. PQ is a chord of a circle. The tangent XR at X on the circle cuts PQ produced at R. If XR = 12 cm, PQ = x cm, QR = x − 2 cm, then x (in cm) is:
1. 7 2. 6 3. 10 4. 14

Q204. MN is the diameter of a circle with centre O. P and S are two points on the circumference of the circle on either side MN, such that ∠PMN = 50° and ∠MNS = 35°. What is the degree measure of the difference of ∠PMS and ∠PNS ?
1. 25° 2. 55° 3. 65° 4. 30°

Q205. AB = 8 cm and CD = 6 cm are two parallel chords on the same side of the centre of a circle. If the distance between them is 2 cm, then the radius (in cm) of the circle is:
1. $\frac{\sqrt{198}}{4}$ 2. $\frac{\sqrt{256}}{4}$ 3. $\frac{\sqrt{156}}{4}$ 4. $\frac{\sqrt{265}}{4}$

Q206. Two circles touch each other internally. Their radii are 3 cm and 4 cm. What is the length of the biggest chord of the circle with radii 4 cm which is outside the inner circle?
1. $5\sqrt{3}$ cm 2. $2\sqrt{3}$ cm 3. $6\sqrt{3}$ cm 4. $4\sqrt{3}$ cm

Q207. In triangle ABC, the straight line parallel to the side BC meets AB and AC at the points P and Q, respectively. If AP = QC, the length of AB is 16 cm and the length of AQ is 4 cm, then the length (in cm) CQ is:
1. $(2\sqrt{18} - 2)$ 2. $(2\sqrt{17} - 2)$
3. $(2\sqrt{21} + 2)$ 4. $(2\sqrt{19} + 2)$

Q208. AB = 8 cm and CD = 6 cm are two parallel chords on the same side of the centre of a circle. If the distance between them is 2 cm, then the radius (in cm) of the circle is:
1. $\frac{\sqrt{198}}{4}$ 2. $\frac{\sqrt{256}}{4}$ 3. $\frac{\sqrt{156}}{4}$ 4. $\frac{\sqrt{265}}{4}$

Q209. In a square ABCD, E is a point inside the square such that triangle DEC is an equilateral triangle. If E is joined to vertices A and B of the square, what is the degree measure of ∠AEB?
1. 135° 2. 210° 3. 150° 4. 225°

Q210. At one end of a diameter PQ of a circle of radius 8 cm a tangent APB is drawn to the circle. Find the length of the chord RS, which is parallel to AB and at a distance of 12 cm from P.
1. $6\sqrt{3}$ cm 2. $4\sqrt{3}$ cm 3. $2\sqrt{3}$ cm 4. $8\sqrt{3}$ cm

Q211. In a triangle ABC, AP, the bisector of ∠A, is perpendicular to BC at point P. The measures of BP and PC are x and 3y, respectively. The measures of AB and AC are 4x and (5y + 21), what is the value of (x + y)?
1. 12 2. 18 3. 21 4. 15

Q212. Chords $\overline{AB}$ and $\overline{CD}$ of a circle intersect inside the circle at point F. If $m\overline{(AF)} = 2.4$ cm, $m\overline{BF} = 1.8$ cm, and $m\overline{CD} = 5.7$ cm, what is the length (in cm) of the longer of the two line segments, $\overline{CF}$ and $\overline{DF}$?
1. 4.5 2. 5.4 3. 3.6 4. 4.8

Q213. 8 cm and 5 cm are the radii of two circles. If the distance between the centres of the two circles is 11 cm, then the length (in cm) of the common tangent of two circles is:
1. 2√7 2. 4√7 3. 3√7 4. √7

Q214. M is the mid-point of side QR of a parallelogram PQRS (P being on the top left hand, followed by other points goes clockwise). The line SM is drawn intersecting PQ produced at T. What is the length (in terms of the length of SR) PT?
1. 2SR 2. SR 3. 3SR/2 4. SR/2

Q215. In triangle STU, V is a point on the side ST and W is a point on the side SU such that VWUT is a trapezium. Given that VW : TU = 2 : 7, what is the ratio of area of trapezium VWUT to the area of the triangle STU?
1. 49 : 81 2. 4 : 45 3. 45 : 49 4. 4 : 49

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Q216. The chord of a circle is equal to its radius. The angle (in degrees) subtended by this chord at any point on the minor arc of the circle is:

1. 120 2. 140 3. 150 4. 130

Q217. The sides of a triangle are 20 cm, 21 cm, and 29 cm. The area of the triangle formed by joining the mid points of the sides of triangle will be:

1. $58\frac{1}{5}$ cm² 2. $47\frac{1}{2}$ cm²
3. $67\frac{2}{3}$ cm² 4. $52\frac{1}{2}$ cm²

CGL MAINS 23

Q218. An equilateral triangle ABC surmounts a square BCDE. The value of ∠EAB + 3 ∠AEB isa:

(a) 80° (b) 60° (c) 240° (d) 280°

SELCTION PHASE XII

Q219. The lengths of the three sides of a triangle are given as 3 cm, 4 cm and 5 cm. The ratio of their corresponding altitudes to the opposite vertices will be:

a) 3:4:5 b) 5:4:3 c) 9:8:7 d) 20:15:12

CPO 2024

Q220. The chord length of a chord made on arc of a circle is equal to the radius of the circle. The length of the arc is _____(in units), if the radius of the circle is 21 units.
(Take π = 22/7)

a) 20 b) 22 c) 24 d) 21

Q221. Two circles with centers B and D have radii DA = 8 cm and BC = x cm, respectively. AC is tangent to both circles. If DB and AC intersect the point E, AE = 12 cm and EC = 18 cm, then find the value of x (in cm).

a) 13 b) 10 c) 11 d) 12

Q222. Triangle DEF is an equilateral triangle with a side length of 12 cm. If point G is the mid-point of side DE, what is the length (in cm) of side FG?

a) 6 b) 6√3 c) 12 d) 3√6

Q223. What is the length (in cm) of chord PQ in a circle with a radius of 7 cm, where a diameter AB and non-diameter chord PQ intersect perpendicularly at point C, and the ratio of AC to BC is 4 : 3?

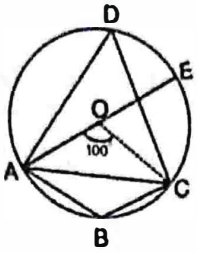
a) 4√3 b) 8√3 c) 2√3 d) 6√3

Q224. Taking any three of the line segments out of segments of length 2 cm, 5 cm, 7 cm and 8 cm, the number of triangles that can be formed is:

a) 1 b) 2 c) 3 d) 4

CHSL 2024

Q225. In the given figure, O is the centre of the circle, AE is the diameter an ∠AOC = 100°.



The value of ∠CDE + ∠CEA is:

a) 90° b) 80° c) 60° d) 100°

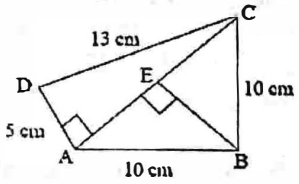
Q226. ΔABC is a right-angled triangle where m ∠ABC = 90°. If $m(\overline{AB}) = 15$ cm, $m(\overline{BC}) = 20$ cm, and $\overline{BD} \perp \overline{AC}$, intersecting $\overline{AC}$ at the point D, find $m(\overline{BD})$ (in cm).

a) 12.5 b) 12 c) 10 d) 9

Q227. In a triangle ABC, BD is perpendicular to AC. E is a point on BC such that angle BEA = x°. If angle EAC = 38° and EBD = 40°, then the value of x is:

a) 82 b) 88 c) 96 d) 48

Q228. What is the area of a quadrilateral ABCD. (shown below) in which sides AB and BC are equal, sides AD and CD are of length 5 cm and 13 cm, respectively, and side AD is perpendicular to the diagonal AC?



a) 82 cm² b) 78 cm² c) 80 cm² d) 75 cm²

Q229. Find the altitude (in cm) from the vertex Q to side PR of triangle PQR with side lengths PQ = 40 cm, PR = 40 cm and QR = 60 cm.

a) 20√7 b) 15√7 c) 30√7 d) 25√7Q299.

Q230. In an obtuse-angled triangle ABC, the length of its longest side AB is 50 cm and one of the other two sides is 42 cm. If the area of the triangle is 294 cm², what is the length (in cm) of its third side?

a) $8\sqrt{35}$ b) $15\sqrt{21}$ c) $2\sqrt{58}$ d) $12\sqrt{43}$

Q231. PQR is a triangle. MN is a line segment intersecting PQ in M and PR in N such that MN ∥ QR and divides ΔPQR into two parts, which are equal in area. What is the ratio of MQ to PQ?

a) $\sqrt{2} : (\sqrt{2} - 1)$ b) $\sqrt{2} : 1$
c) $(\sqrt{2} - 1) : \sqrt{2}$ d) $1 : \sqrt{2}$

Q232. A right angled triangle of area 600 m² is to be made such that the hypotenuse is double the base. For the triangle, the hypotenuse is _____ more than the base.

a) 20.36 m b) 22.32 m

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c) 24.36 m d) 26.32 m

Q233. In a right-angled triangle ABC such that ∠BAC = 90° and AD is perpendicular to BC. If the area of triangle ABC is 63 cm², area of triangle ACD = 7 cm², and AC = 5 cm, then the length of BC is equal to:

a) 10 cm b) 15 cm
c) 19 cm d) 12 cm

Q234. PQ is parallel to SR in a trapezium PQRS. It is given that PQ > SR and the diagonals PR and QS intersect at O. If PO = 3x − 15, OQ = x + 9, OR = x − 5 and OS = 5 and x has two values x_1 and x_2, then the value of $(x_1^2 - x_2^2)$ is:

a) 15 b) 11 c) 19 d) 13

Q235. The perimeter of a triangle is 36 units. Its area cannot be more than _____ square units.

a) $36\sqrt{2}$ b) $36\sqrt{3}$
c) $12\sqrt{7}$ d) $18\sqrt{5}$

Q236. Two circles of diameters 16 cm and 20 cm are such that the distance between their centers is 13 cm. What is the length (in cm) of a common tangent to these circles that does not intersect the line joining the centers?

a) $\sqrt{165}$ b) $\sqrt{173}$ c) $\sqrt{167}$ d) $\sqrt{163}$

Q237. In ΔABC the straight line parallel to the side BC meets AB and AC at the points P and Q, respectively. If AP = QC, the length of AB is 12 cm and the length of AQ is 2 cm, then the length (in cm) of CQ is:

a) 6 b) 4 c) 3 d) 2

Q238. In right triangle ABC with right angle at C, M is the mid-point of hypotenuse AB. C is joined to M and produced to a point D, such that DM = CM. Point D is joined to B. If CD = 10 cm, and BD = 6 cm, find the value of CM.

a) 8 cm b) 5 cm
c) 9.5 cm d) 11.4 cm

Q239. A bigger circle centre at O and a smaller circle centre at P touch each other externally such that the length of their common tangent LM is 12 cm. If the radius of the bigger circle is 18 cm, then what will be the radius (in cm) of the smaller circle?

a) 4 b) 3 c) 2 d) 1

Q240. The sides ST and TR and the median SU of the triangle STR are equal to the sides MN and NJ and the median MV of the triangle MNJ, respectively. If ∠TSU = 46°, ∠NMJ = 79° and ∠MVN = 88°, what is the degree measure of $\frac{7}{11}\angle SRT$?

a) 35° b) 55° c) 56° d) 47°

Q241. In a circle with center O, the diameter AB extended to the point C, outside the circle. CD is a tangent at the point D on the circle. If the radius of circle is 6 cm and ∠DBC = 120°, then the length of CD is equal to:

a) $5\sqrt{3}$ cm b) $3\sqrt{3}$ cm
c) $6\sqrt{3}$ cm d) $4\sqrt{3}$ cm

Q242. Two circles with centres M and N have radii 5 cm and 8 cm, respectively. The circles touch each other externally at point T. A line PR is drawn such that the points M, T and N lie on PR, P being closer to M. From P, a tangent PQ = 12 cm is drawn to the circle with centre M touching at Q, and from R, another tangent RS = 15 cm is drawn to the circle with centre N touching at S. What is the length (in cm) of PR?

a) 37 b) 43 c) 53 d) 26

Q243. CD is a tangent to a circle of circumference of 88 cm with its centre at O. OC cuts the circle at P while OD cuts circle at V such that ∠COD = 90°. Length of PC is 6 cm. What is half of CD (in cm) if OD exceeds OC by 1 cm?

a) 15.5 b) 14.5 c) 31 d) 16.5

Q244. In a triangle ABC, AB = 6 units, BC = 8 units and AC = 10 units. Let M be a point on AC such that BM = 5 units. With a point D, a triangle BMD is formed and the triangle BMD is similar to the triangle ABC with $\frac{BM}{AB} = \frac{BD}{AC}$. What is the length of BD in units?

a) $\frac{35}{3}$ b) $\frac{40}{3}$ c) $\frac{25}{3}$ d) $\frac{10}{3}$

Q245. Two circles of radius 7 units each, intersect in such a way that the common chord is of length 7 units. What is the common area in square units of the intersection?

a) $98\left(\frac{\pi}{6} - \frac{\sqrt{3}}{3}\right)$ b) $98\left(\frac{\pi}{3} - \frac{\sqrt{3}}{4}\right)$
c) $98\left(\frac{\pi}{6} - \frac{\sqrt{3}}{6}\right)$ d) $98\left(\frac{\pi}{6} - \frac{\sqrt{3}}{4}\right)$

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Q246. If the lengths of two sides of an isosceles triangle are 6 cm and 12 cm, then find the length of the third side.

a) 8 cm b) 6 cm c) 12 cm d) 14 cm

Q247. It is always possible to draw a circle passing through _____ non-collinear points in a plane.

a) 3 b) 6 c) 5 d) 4

Q248. In a quadrilateral ABCD, AB = BC, AD = DC. ∠ABD = 68°, ∠ADB = (2y − 7)°, ∠BDC = 33°, ∠DBC = (3x + 2)°. Then the value of 2x + 3y is:

a) 108 b) 144 c) 104 d) 118

Q249. The two circles intersect at two points P and Q. PR and PS are diameters of the two circles. What is ∠PQR ?

a) 90° b) 0° c) 45° d) 60°

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Q250. AB is a chord of length 32 cm of a circle of radius 20 cm, the tangents at A and B intersect at a point T. Find length TA (rounded off to two digits after decimal).
a) 36.50 cm b) 21.33 cm
c) 26.67 cm d) 19.93 cm

Q251. PQ and RS are common tangents to two circles intersecting at A and B. A and B, when produced on both the sides, meet the tangents PQ and RS at X and Y, respectively. If AB = 3 cm and XY = 5 cm, then PQ is _____.
a) 5 cm b) 3 cm c) 6 cm d) 4 cm

Q252. From a point A, a tangent line is drawn to the circle of radius 7 units. From the same point, a secant is drawn to the circle which cuts the circle at B and C and the point B is near A than C. what is the length of BC in units if the length of the tangent to the circle from point A is 21 units and the length of AB is 14 units?
a) 18.5 b) 16.5 c) 15.5 d) 17.5

Q253. In a triangle ABC right-angled at C, if tan A = $\sqrt{3}$, then the value of sin A cos B cot(A + B) is:
a) √3 b) 1 c) 0 d) 2

Q254. Q36. In triangle ABC, two medians AD andBE Intersect at G at right angles. If AD = 12 cm and BE = 9 cm, then the length of AB is equal to:
a) 16 cm b) 12 cm c) 14 cm d) 10 cm

Q255. A right triangle with sides 3 cm, 4 cm and 5 cm is rotated about the sides of 3 cm to form a cone. The volume of the cone so formed is :
a) 20π cm^3 b) 16π cm^3
c) 25π cm^3 d) 28π cm^3

Q256. The side of an equilateral triangle is 28 cm. Taking each vertex as the centre, a circle is described with a radius equal to half the length of the side of the triangle. Find the area of that part of the triangle which is not included in the circles (use π = 22/7 and √3 = 1.73).
a) 30.89 cm^2 b) 38.08cm^2
c) 31.08 cm^2 d) 39.08 cm^2

Q257. A and B are centres of two circles with radii 2 cm and 1 cm respectively, where AB = 5 cm. C is the centre of another circle of radius r cm, which touches each of the above two circles externally. If ∠ACB = 90°, then the value of r is:
a) 5 cm b) 2 cm c) 3 cm d) 4 cm

Q258. ABC is an equilateral triangle. P, Q and R are the mid-points of sides AB, BC and CA, respectively. If the length of the side of the triangle ABC is 11 cm, then the area (in cm^2) of triangle PQR is:
a) $\frac{21\sqrt{3}}{16}$ b) $\frac{11\sqrt{3}}{16}$ c) $\frac{121\sqrt{3}}{16}$ d) $\frac{111\sqrt{3}}{16}$

Q259. If two straight lines are coinciding with each other, then the number of points of intersection is/are:
a) no points of intersection
b) unique point of intersection
c) finite number of point of intersection
d) infinitely many points of intersection

Q260. Two circles, centred at P and Q intersect at two points C and D. AB is tangent to the two circles at A and B. If ∠ADB = 68°, then ∠ACB = _____.
a) 132° b) 112° c) 124° d) 102°

Q261. From a point T, a tangent TP at point P, is drawn to a circle with centre O. A From a point T, a tangent TP at point P, is drawn to a circle with centre O. A secant TQR (point Q is near to point T) is drawn from the point T. ΔPQR is inscribed into the circle by joining the points P, Q and R. Draw lines OQ and OR. ΔPQR is secant TQR (point Q is near to point T) is drawn from the point T. If ∠PTQ is 27° and ∠TPQ = 55°, what is the degree measure of ∠ROQ?
a) 86 b) 82 c) 98 d) 94

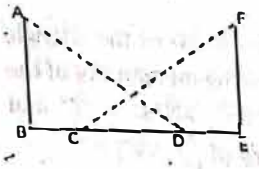
Q262. A triangle ABC is made on a circle, where AB is diameter of the circle. If BC is equal to the radius of the circle and $\angle ABC = x\,\angle BAC$, then x is:
a) 2.5 b) 2 c) 1 d) 1.5

Q263. Two equal circles pass through each other's centre. If the radius of each of the circle is 13 cm, then what is the length of the common chord?
a) $13\sqrt{6}$ cm b) $7\sqrt{3}$ cm c) $13\sqrt{2}$ cm d) $13\sqrt{3}$ cm

Q264. From a point A, which is at a distance of 17 cm from the centre C of a circle with radius 8 cm, the pair of tangents AB and AD to the circle are drawn. The area of the quadrilateral ABCD is _____ cm^2.
a) 360 b) 192 c) 120 d) 60

Q265. ΔABC is a right-angled triangle with ∠ABC = 90°. If $m(\overline{AB}) = 28\ cm$, and $m(\overline{BC}) = 96\ cm$, find the area (In cm^2) of the circumcircle of ΔABC. (Use ë = 3.14)
a) 8,164 b) 7,850 c) 7,536 d) 7,693

Q266. In ΔABD and ΔFEC, ∠BAD = 60°, 1(BD) = 1(EC), ∠ABD = ∠FEC = 90°, and 1(AB) = 1(FE). Find the ratio of $\frac{\angle BAD}{\angle FCE}$.



a) 2 : 1 b) 2 : 5 c) 1 : 2 d) 2 : 3

Q267. In ΔABC, DE || BC and 5 AE = 3 EC. If AB = 6.4 units, then the value of DB (in units) is:
a) 5 b) 4 c) 2.4 d) 3.2

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ANSWERS

1	A	2	C	3	C
4	C	5	D	6	D
7	B	8	A	9	A
10	A	11	D	12	B
13	C	14	A	15	D
16	C	17	C	18	A
19	B	20	B	21	B
22	D	23	D	24	B
25	B	26	C	27	B
28	D	29	D	30	C
31	B	32	B	33	B
34	C	35	D	36	B
37	B	38	D	39	A
40	B	41	D	42	C
43	A	44	C	45	A
46	A	47	C	48	C
49	B	50	A	51	B
52	A	53	A	54	A
55	C	56	C	57	B
58	A	59	D	60	D
61	C	62	D	63	B
64	C	65	D	66	B
67	A	68	C	69	B
70	D	71	C	72	A
73	A	74	D	75	B
76	D	77	D	78	D
79	C	80	C	81	C
82	D	83	C	84	C
85	D	86	D	87	D
88	D	89	C	90	D
91	B	92	D	93	D
94	B	95	A	96	D
97	A	98	D	99	C
100	D	101	D	102	D
103	B	104	C	105	B
106	C	107	B	108	C
109	B	110	D	111	A
112	B	113	C	114	A
115	A	116	D	117	A
118	A	119	C	120	C
121	D	122	D	123	A
124	C	125	B	126	B
127	B	128	A	129	A
130	C	131	C	132	B
133	A	134	A	135	C
136	A	137	A	138	C
139	B	140	B	141	D
142	C	143	B	144	A
145	B	146	B	147	C
148	B	149	D	150	D
151	A	152	C	153	B

154	D	155	A	156	D
157	D	158	C	159	A
160	C	161	B	162	D
163	C	164	D	165	A
166	B	167	A	168	A
169	A	170	D	171	D
172	B	173	A	174	A
175	B	176	C	177	C
178	C	179	D	180	C
181	A	182	B	183	B
184	C	185	B	186	B
187	A	188	D	189	B
190	C	191	A	192	D
193	C	194	A	195	A
196	A	197	B	198	D
199	B	200	A	201	D
202	A	203	C	204	D
205	D	206	D	207	B
208	D	209	C	210	D
211	A	212	D	213	B
214	A	215	C	216	C
217	D	218	B	219	D
220	B	221	D	222	B
223	B	224	B	225	A
226	B	227	B	228	B
229	B	230	C	231	C
232	D	233	B	234	B
235	B	236	A	237	B
238	B	239	C	240	A
241	C	242	B	243	B
244	C	245	D	246	C
247	A	248	C	249	A
250	C	251	D	252	D
253	C	254	D	255	B
256	C	257	B	258	C
259	D	260	B	261	A
262	B	263	D	264	C
265	B	266	A	267	B

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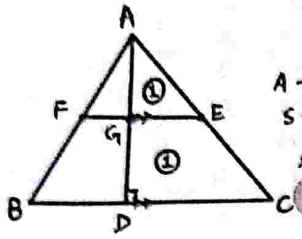
1.



AG : AD

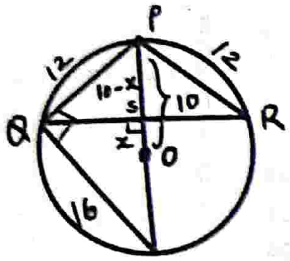
A → 1 : 2

S → 1 : $\sqrt{2}$

So, GD : AG

$\sqrt{2}-1 : 1$

2.



Method – 1

$QS = \frac{12 \times 16}{20} = 9.6$

$QR = 19.2$

$PS = \sqrt{12^2 - 9.6^2} = 7.2$

$OS = 10 - 7.2 = 2.8$ Ans

Method – 2

$144 = 20 \times PS$

$PS = 7.2$

$OS = 10 - 7.2 = 2.8$

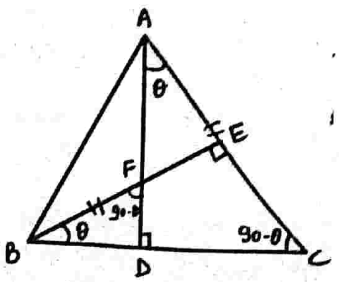
Method – 3

$144 - 100 - x^2 + 20x = 100 - x^2$

$20x = 56$

$x = \frac{56}{20} = 2.8$ Ans

3.

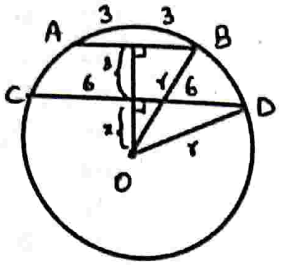


$\Delta ADC \cong \Delta BDF$

$\therefore BD = AD$

So $\angle ABC = 45°$

4.



$(3+x)^2 + 3^2 = 6^2 + x^2$

$9 + x^2 + 6x + 9 = 6^2 + x^2$

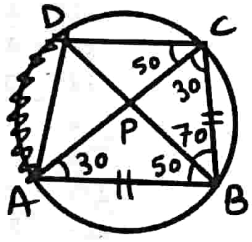
$6x = 18$

$x = 3$

$y^2 = 6^2 + x^2 = 36 + 9$

$y = \sqrt{45} = 3\sqrt{5}$ Ans

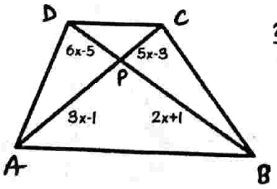
5.



CurrentMUDDE

$\angle PCD = 50°$

6.



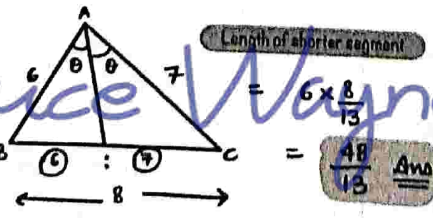
$\frac{2x+1}{6x-5} = \frac{3x-1}{5x-3}$

$x = 2$

$DB = 6x - 5 + 2x + 1 = 8x - 4$

$DB = 12$ Ans

7.

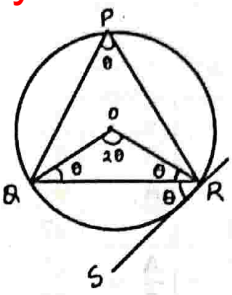


Length of shorter segment $= 6 \times \frac{8}{13}$

$= \frac{48}{13}$ Ans

8.

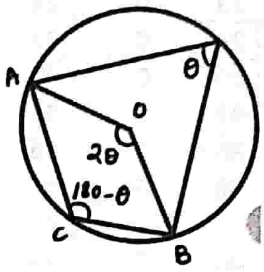
9.



$\theta + \theta + 2\theta = 180°$

$\theta = 45°$

$\angle RPQ = 45°$ Ans



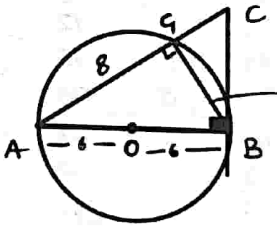
$2\theta = 180° - \theta$

$3\theta = 180°$

$\theta = 60°$

$\angle AOB = 2 \times 60 = 120°$ Ans

10.

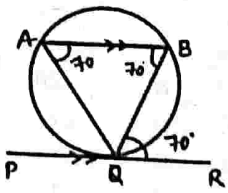


$BC = \sqrt{12^2 - 8^2} = 4\sqrt{5}$

$BC = \frac{12 \times 4\sqrt{5}}{8}$

$= 6\sqrt{5}$ Ans

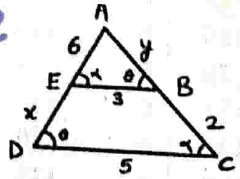
11.



$\angle ABB = 180 - 70 - 70$

$\angle ABB = 40°$ Ans

12.



$\frac{6}{y+2} = \frac{3}{5}$

$y = 8$

$\frac{8}{6+x} = \frac{3}{5}$

$x = \frac{22}{3}$

$AB + DE = y + x$

$= 8 + \frac{22}{3} \Rightarrow \frac{46}{3}$ Ans

13.

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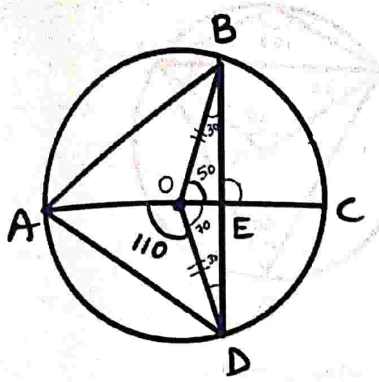
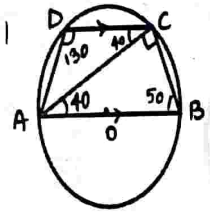


Angle BEC = 50° + 30° = 80°
Or Directly = (50+110)/2 = 80°

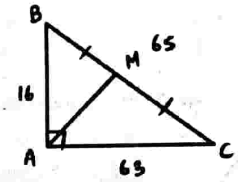
14.



$\angle CAD = 180 - (130+40)$

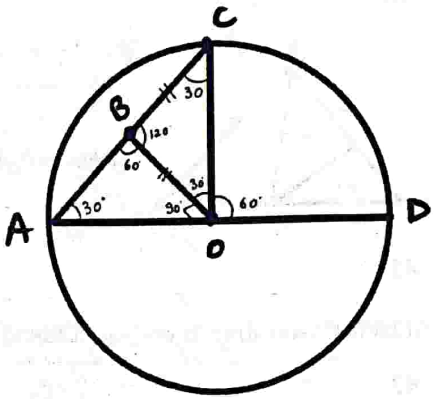
$\angle CAD = 10°$ Ans

15.



$Am = \frac{65}{2} = 32.5$

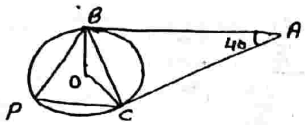
16.



$OB = BC$

$Bc = 5cm$

17.



$\angle BPC = 90 - \frac{40}{2}$

$= 70$

$\angle BOC = 180 - 40$

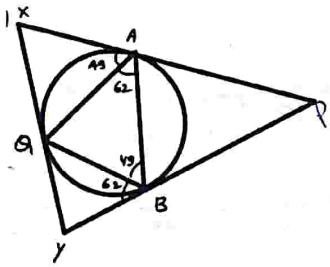
$= 140$

$\angle ABC = \angle ACB = \frac{140}{2} = 70°$

$\angle PBC = \angle PCB = 70$ [alternate]

$\angle CBP = 180 - 140 = 40$

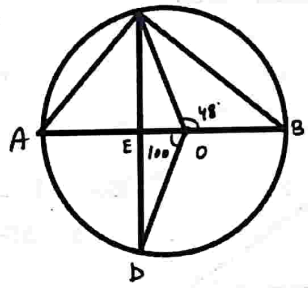
18.



$\angle AQB = 180 - (62+49)$

$= 69°$ Ans

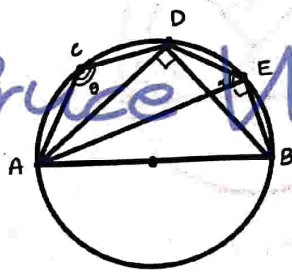
19.



$\angle CEB = \frac{48+100}{2}$

$\angle CEB = 74°$ And

20.



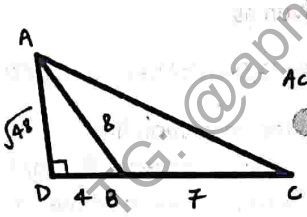
$\theta + \alpha = 180°$

$\angle ACD + \angle DEB = \theta + \alpha + 90°$

$= 180° + 90°$

$= 270°$ Ans

21.



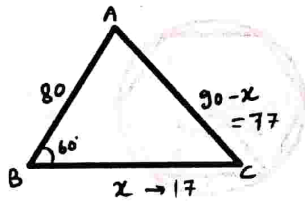
$Ac^2 = 48 + 121$

$Ac = 13$

22.

$^{11}C_3 \rightarrow \frac{11 \times 10 \times 9}{3 \times 2 \times 1} = 165$ Ans

23.



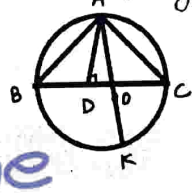
$\cos 60° = \frac{6400 + x^2 - (90-x)^2}{2 \times 80 \times x}$

$x = 17$ → shortest side

24.

A unique circle can be drawn through 3 non-collinear points.

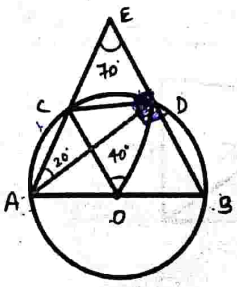
25. → circumcenter & Altitude property.



$\angle DAK = 80 - 64$

$\angle DAK = 16°$

26.



or $\angle CED = \frac{180 - \theta}{2}$

$\theta = 40°$ Ans

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$x+z-z-y=4$

$x-y=4$

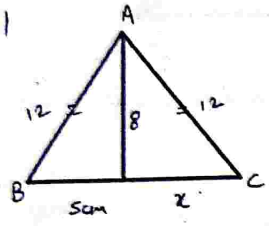
$x+z-x-y=2$

$z-y=2$

$x+y+z=16$

$PB+AR = x+z = \frac{38}{3}$ Ans

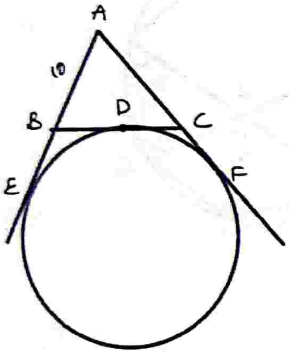
43.



$144 = 64 + 5x$

$x = 16$ cm Ans

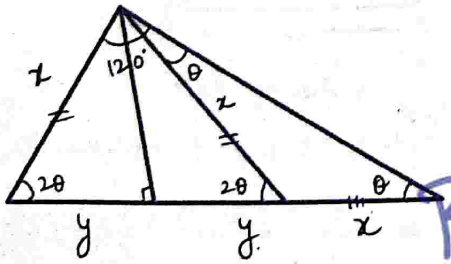
44.



$AE = \frac{10+6.4+8.6}{2} = 12.5$

$BE = 12.5 - 10 = 2.5$ Ans

45.

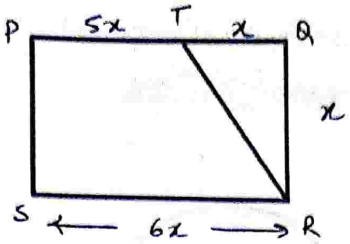


$3\theta + 120 = 180$

$\theta = 20°$

$\angle R = 2\theta = 40°$ Ans

46.

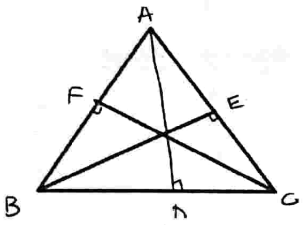


$\frac{1}{2} \times x^2 = 12\sqrt{3}$

$x^2 = 24\sqrt{3}$

$6x^2 = 144\sqrt{3}$ Ans

47.



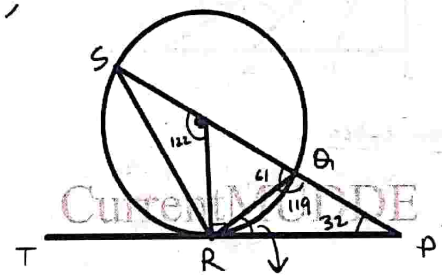
$AC = \frac{2}{\sqrt{3}} AD$

$\sqrt{3}AC = 2AD$

$3AC^2 = 4AD^2$

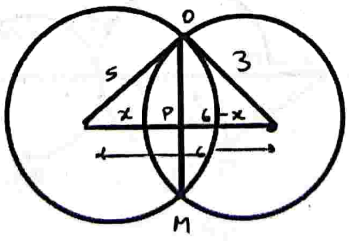
$3AC^2 = 4BE^2$

48.



$180 - 32 - 119 = 29°$

49.



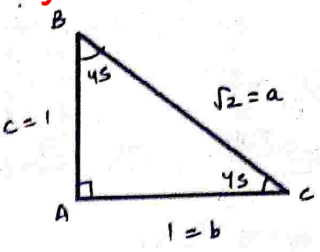
$25 - x^2 = 9 - (6-x)^2$

$x = 13/3$

$OP = 25 - \frac{169}{9} = \frac{2\sqrt{14}}{3}$

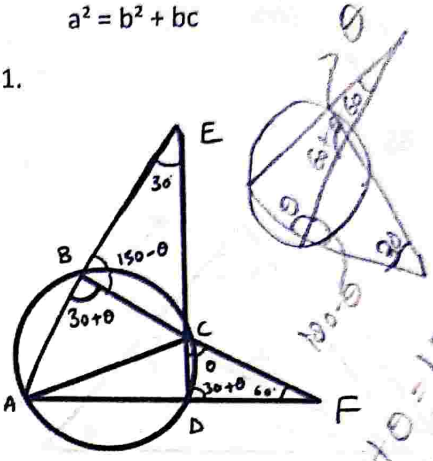
$OM = \frac{4\sqrt{14}}{3}$ Ans

50.



$a^2 = b^2 + bc$

51.



$\theta + 30 + \theta + 60 = 180°$

$2\theta = 90$

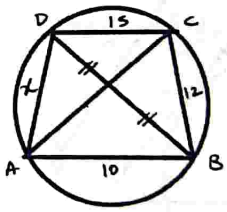
$\theta = 45°$

$\angle ABC = 75°$ Ans

$60 + \theta = 180 - \theta + 30$

$\theta = 75$

52.

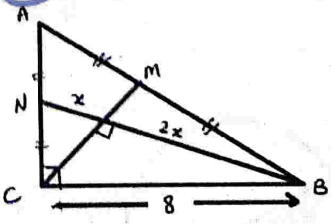


$15 \times 12 = 10 \times x$

$x = 18$ cm Ans

53. Here D is centroid. so, D divides BN into 2: 1 ratio. Here BCN is right angle triangle in CD perpendicular to BN.

$BC^2 = BD * BN$



$2x \times 3x = 8^2$

$x = \frac{8}{\sqrt{6}}$

$BN = 4\sqrt{6}$ cm Ans

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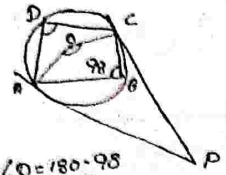
54.

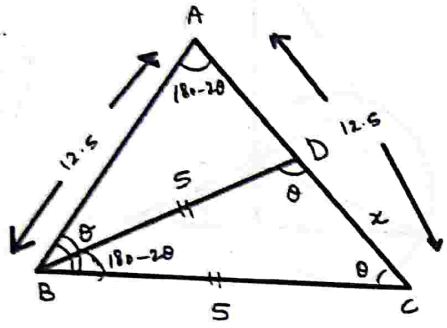


$\angle D = 180 - 98 = 82$

$\angle AOC = 2 \times 82 = 164$

$\angle APC = 180 - 164 = 16°$

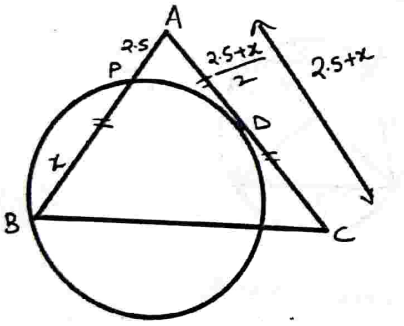
55.



$\frac{12.5}{S} = \frac{S}{x}$

$x = DC = 2cm$ Ans

56.

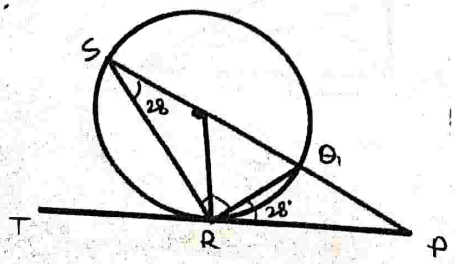


$(2.5)(2.5+x) = \frac{(2.5+x)(2.5+x)}{4}$

$x = 7.5\ cm$

$AB = 2.5 + 7.5 = 10\ cm$ Ans

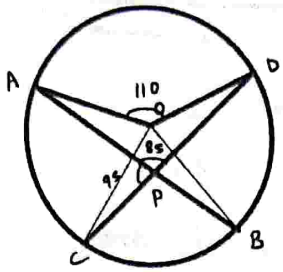
57.



$\angle SPR = 180 - [28 + 90 + 28]$

$\angle SPR = 34°$ Ans

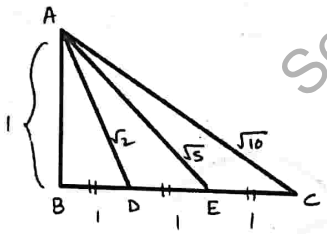
58.



$85 = \frac{110 + \angle BOC}{2}$

$\angle BOC = 60°$ Ans

59.



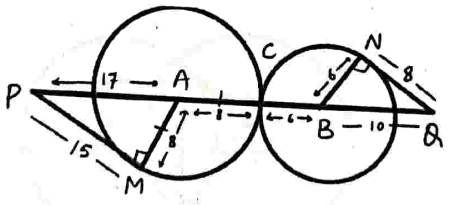
From option

$84^2 = 3AC^2 + 5AD^2$

$8 \times 5 = 3 \times 10 + 5 \times 2$

$40 = 40$ Ans

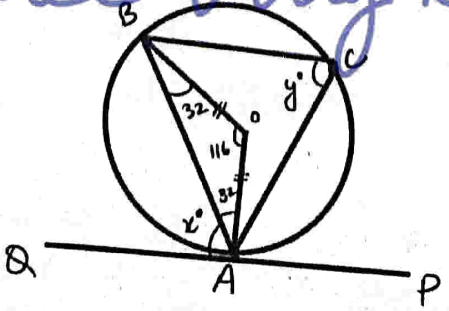
60.



$AB = 8 + 6$

$AB = 14cm$ Ans

61.

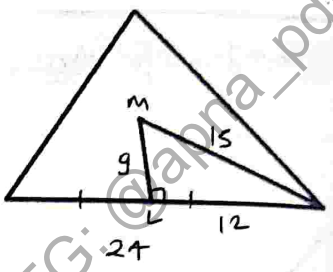


$y° = \frac{116}{2} = 58°$

$x° = y°$

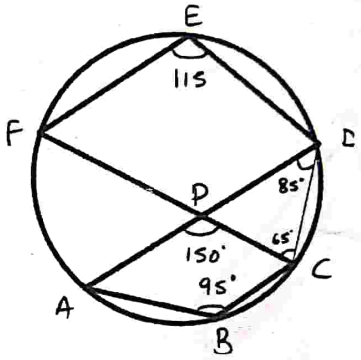
$x + y = 116$ Ans

62.



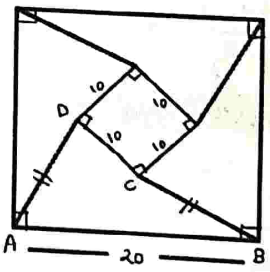
ML = 9 cm.

63.



$\triangle APC = 150°$

64.

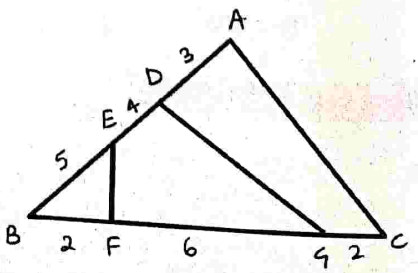


Area of ABCD =

$\frac{1}{4}$[Ar. of Big Sq. − Ar. of Small Sq.]

$\Rightarrow \frac{1}{4}[20^2 - 10^2] = 75$ Ans

65.



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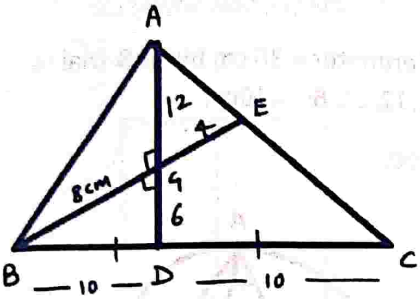
$\frac{M}{N} = \frac{\frac{1}{2}\times 9\times 8 - \frac{1}{2}\times 5\times 2}{\frac{1}{2}\times 12\times 10}$

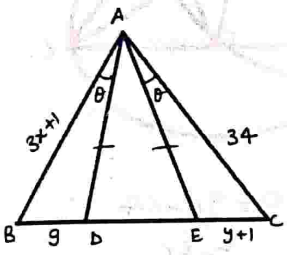
$= \frac{31}{60}$ Ans

66.



By Pythagoras, BD = 10 cm.

67.



$3x+1 = 34$

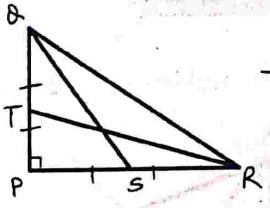
$x = 11$

$y+1 = 9$

$y = 8$

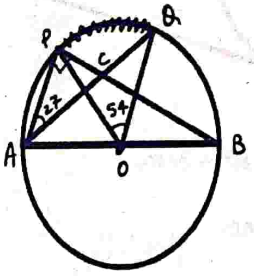
$x+y = 19cm$

68.



$\frac{RQ^2}{QS^2+RT^2} = \frac{4}{5}$

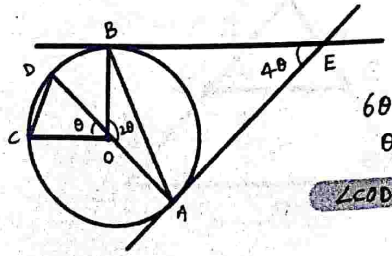
69.



$\angle PCA = 90-27$

$\angle PCA = 63°$

70.

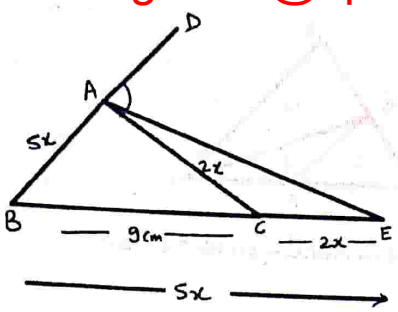


$6\theta = 180°$

$\theta = 30°$

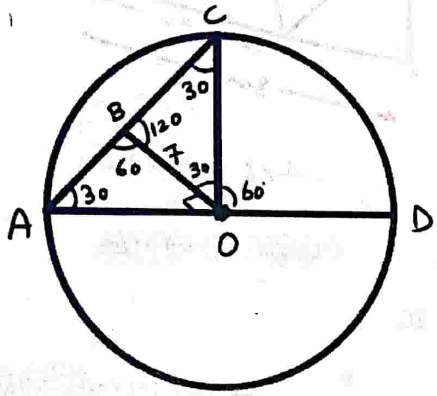
$\angle COD = 30°$

71.



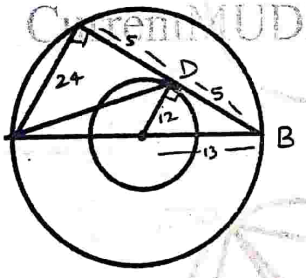
3X => 9, 2X => 6.

72.



OB = BC = 7CM

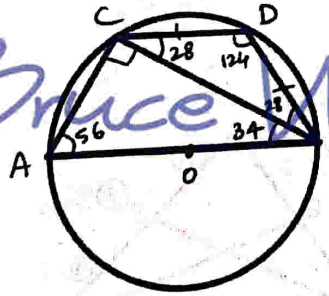
73.



$AD^2 = 24^2 + 5^2$

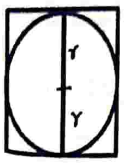
AD = 24.5 cm Ans

74.



△ DBC = 28 °

75.



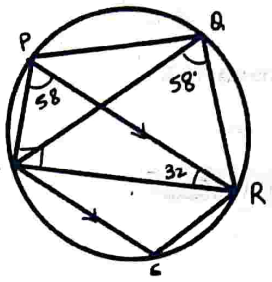
$a^2 = 784$

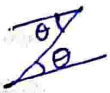
$a = 28$

$r = 14$

Area = $\pi \cdot 14^2 = 616\ cm^2$

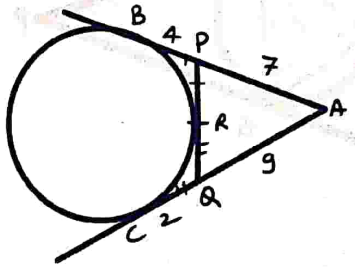
76.





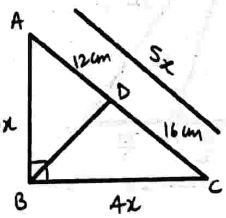
△ RTS = 32 °

77.



PQ = 4 +2 = 6

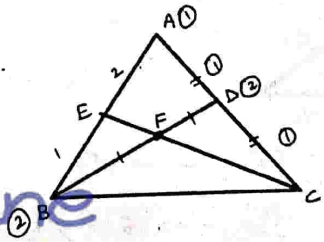
78.



$5x \rightarrow 28$

$2x \rightarrow 67.2cm$

79.



By MPG, 2=> 30, 1=> 15.

80.

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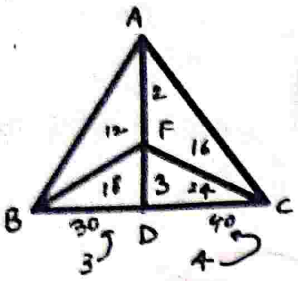
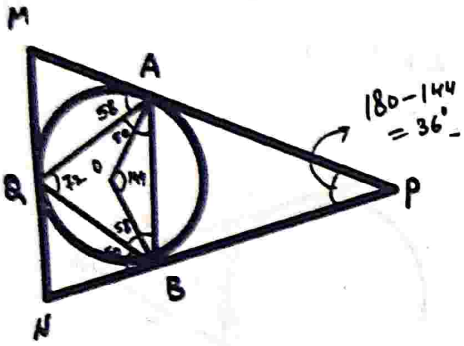


ar△ECD : ar△AEB

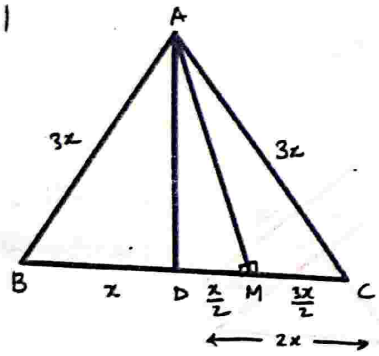
24 : 12

2 : 1 Ans

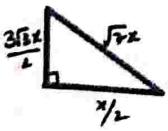
81.



82.



$Am = \frac{\sqrt{3}}{2} \times 3z = \frac{3\sqrt{3}x}{2}$



$\sqrt{7}x \longrightarrow 5\sqrt{7}$

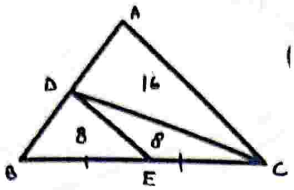
$3z \longrightarrow 15cm$ Ans

83.

5,12,13 => Right angle Triangle,

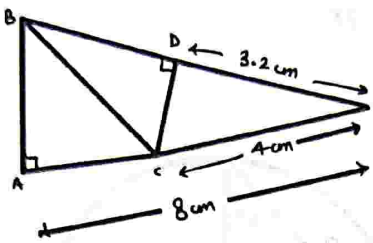
Smallest = $\frac{5\times12}{13}$

84.



Area of ADEC = 16 +8 = 24 cm².

85.

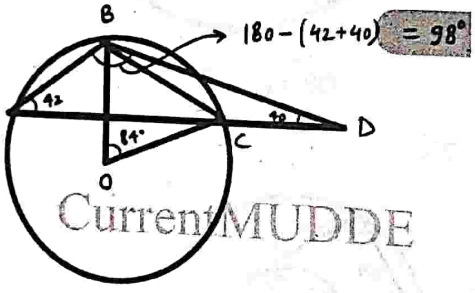


$4 \times 8 = PB \times 3.2$

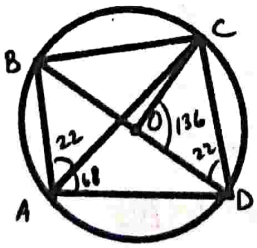
$PB = 10$

BD = 10 − 3.2 = 6.4 cm Ans

86.

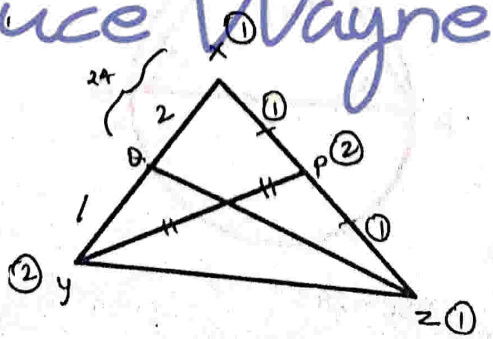


87.



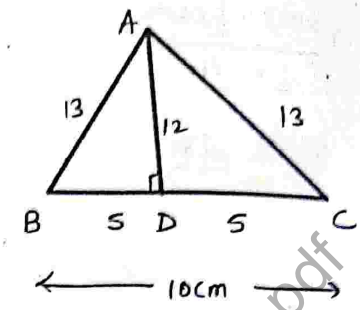
∠COD = 136°

88.



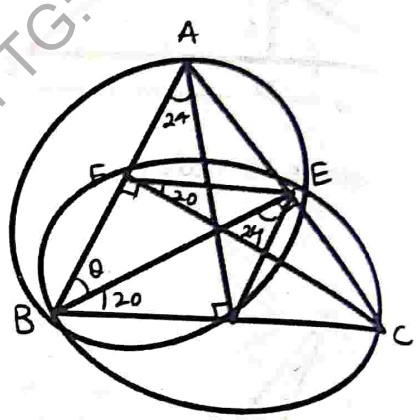
2=> 24, 1 => 12

89.



Perimeter = 36 cm by hit & trial 5,12,13. BC = 10cm.

90.

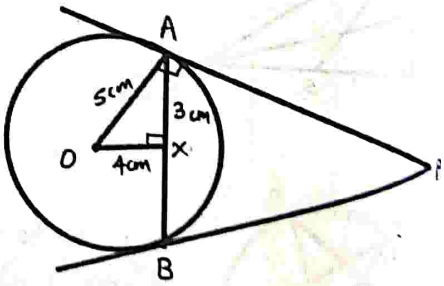


$\angle B = 20 + \theta = 90 - 24$

$= 66$

θ = 46° Ans

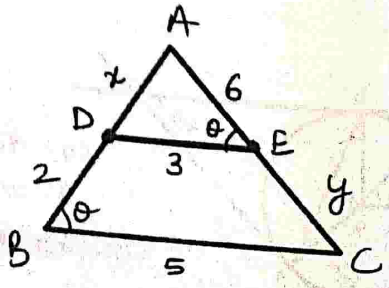
91.



By pythagoras, AX = 3cm.

$AP = \frac{5\times3}{4} = 3.75cm.$

92.



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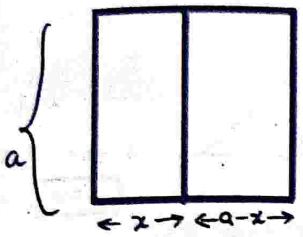
$\frac{x}{6+y} = \frac{3}{5} = \frac{6}{x+2}$

$x = 8, \quad y = \frac{22}{3}$

$AB + AC = x + 2 + 6 + y$

$\frac{70}{3}$ Ans

93.



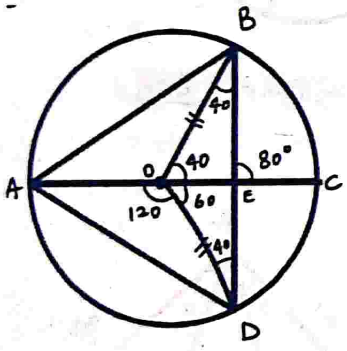
$2(a+x) = 39$ | $2a + 2a - 2x = 39$

$4a - 2x = 39$

$a = 13$

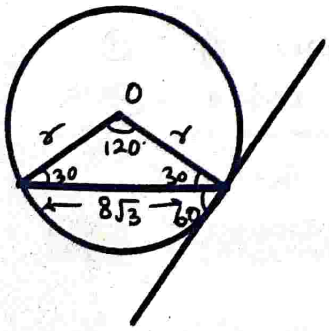
Perimeter $= 4a = 52$ cm Ans

94.



$\angle BED = 80°$

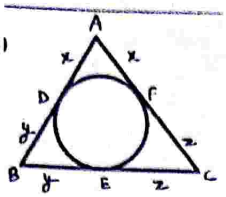
95.



$120° \longrightarrow 8\sqrt{3}$

$30° \longrightarrow$ 8 Ans

96.



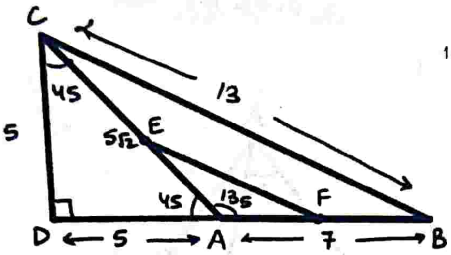
$x+y = 12, \; y+z = 8, \; z+x = 10$

So, $x+y+z = 15$

$x = 7, \quad z = 3$

$\frac{x}{z} = \frac{7}{3}$ Ans

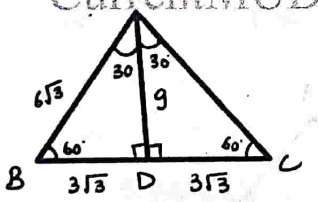
97.



Triplet $\rightarrow (5, 12, 13)$

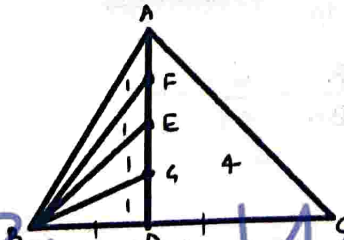
$EF = \frac{BC}{2} = 6.5$ cm Ans

98.



$\angle A = 60°$

99.



Area of $\Delta BFG = \frac{1}{4}$ (Ar of ΔABC)

100.

$ab = 24$

$1 \times 24 \longrightarrow 2 \times 1 - 1 = 1\Delta$

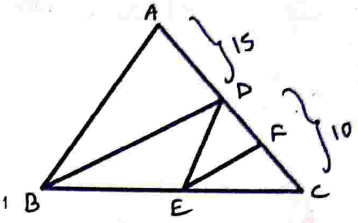
$2 \times 12 \longrightarrow 2 \times 2 - 1 = 3\Delta$

$3 \times 8 \longrightarrow 2 \times 3 - 1 = 5\Delta$

$4 \times 6 \longrightarrow 2 \times 4 - 1 = 7\Delta$

16Δ Ans

101.



$\frac{3}{2} \rbrack \rightarrow 5 \longrightarrow 10$

$2 \longrightarrow 4$ Ans

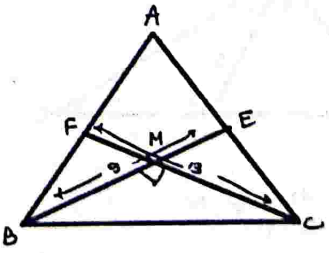
102.

$a + b = 16$

1	15	$\rightarrow 1\Delta$
2	14	$\rightarrow 1\Delta$
3	13	$\rightarrow 1\Delta$
4	12	$\rightarrow 1\Delta$
5	11	$\rightarrow 1\Delta$
6	10	$\rightarrow 2\Delta$
7	9	$\rightarrow 2\Delta$
8	8	$\rightarrow 1\Delta$

24Δ Ans

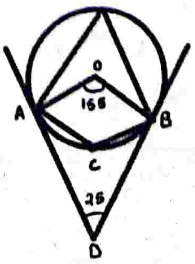
103.



$\Delta ABC = \frac{4}{3} \times \frac{1}{2} \times 9 \times 13$

$= 78 \text{ cm}^2$ Ans

104.



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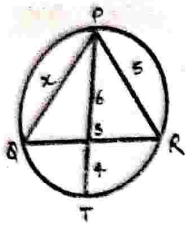
$\angle ACB = 180° - \frac{155}{2}$

$\Rightarrow 102.5°$ Ans

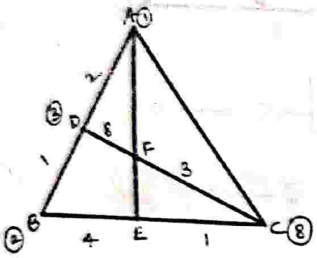
105.



$x \times 5 = 10 \times 6$

$x = 12$ Ans

106.



FD:FC = 8:3

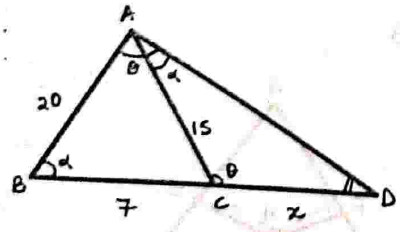
107.

$\frac{a}{b} = \frac{4}{5}$

$\frac{2\pi r}{\pi r^2} = \frac{aa}{ba}$

$r = 2$ Ans

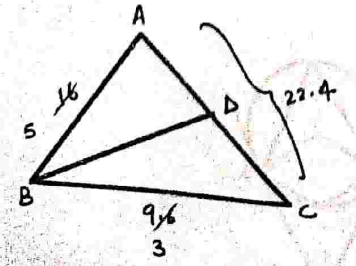
108.



$\frac{15}{20} = \frac{AD}{7+x} = \frac{x}{AD}$

$x = 9$ cm Ans

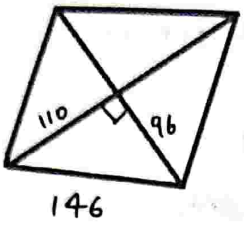
109.



$\frac{22.4}{8} \times 5$

$= 14$ cm Ans

110.

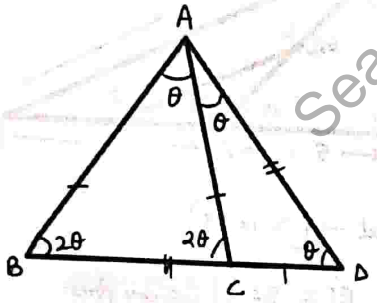


146

Area $= \frac{1}{2} \times 220 \times 192$

$= 2.112$ Hec Ans

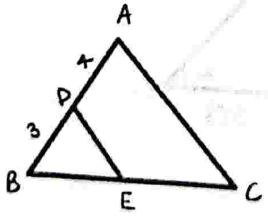
111.



$5\theta = 180°$

$\theta = 36°$ Ans

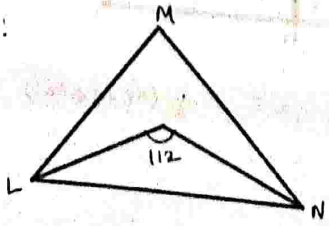
112.



$\frac{p}{q} = \frac{9}{40}$ $\quad p - q = 31$ Ans

$\frac{\Delta BDE}{\Delta ABC} = \frac{9}{49}$

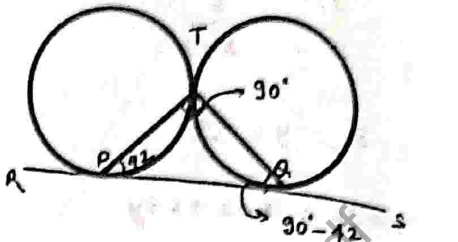
113.



$\angle M = (112 - 90) \times 2$

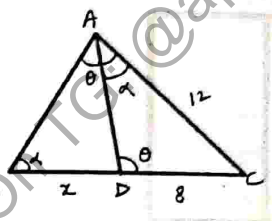
$= 44°$ Ans

114.



$= 48°$ Ans

115.



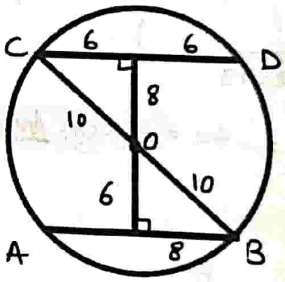
$\frac{8}{12} = \frac{12}{x+3}$

$8x + 64 = 144$

$x = 10$

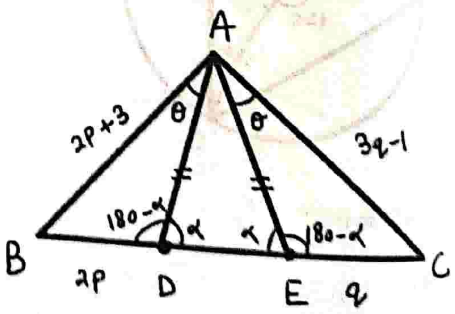
$BC = 18$ cm Ans

116.



$CD = 12$ cm Ans

117.



$2p + 3 = 3q - 1$ — (i)

$2p = q$ — (ii)

$q = 2, \quad p = 1$

$p + q = 3$ Ans

118.

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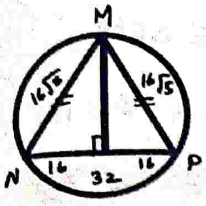


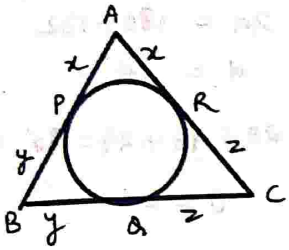
height of Δ = 32

$R = \frac{abc}{4\Delta}$

$= \frac{16\sqrt{5} \times 16\sqrt{5} \times 32}{4 \times \frac{1}{2} \times 32 \times 32}$

R = 20 cm Ans

119.



$x+y-y-z = 4$

$x-z = 4$ —(I)

$x+y-x-z = 2$

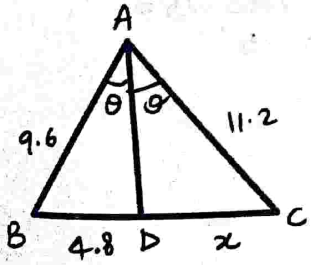
$y-z = 2$ —(II)

$x+y+z = 16$ —(III)

Solving, $x = \frac{22}{3}$, $z = \frac{10}{3}$

$x+z = \frac{32}{3}$ Ans

120.

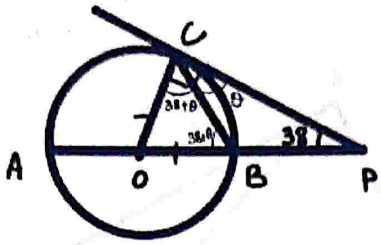


$\frac{9.6}{11.2} = \frac{4.8}{x}$

$x = 5.6$

Perimeter = 31.2 Ans

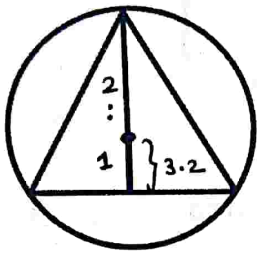
121.



$2\theta + 38 = 90°$

$\theta = 26°$ Ans

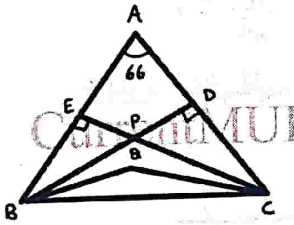
122.



1 ⟶ 3.2

3 ⟶ 9.6 cm Ans

123.



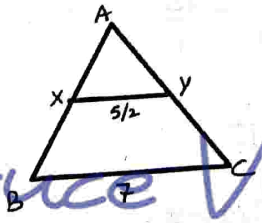
$\angle BPC = 180 - 66 = 114$

$\angle BQC = 90 + \frac{114}{2}$

$\angle BQC = 147$ Ans

124. Obtuse Angle

125.

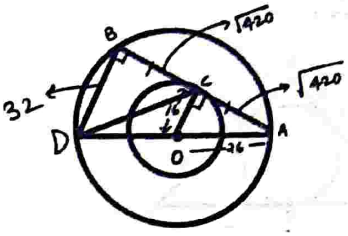


$\frac{xy}{BC} = \frac{5}{14}$

$\frac{Ar.\Delta Axy}{Ar\,\Delta ABC} = \frac{25}{196}$

$\frac{Ar\,\Delta Axy}{Ar\,\square xyBC} = \frac{25}{171}$ **Ans**

126.

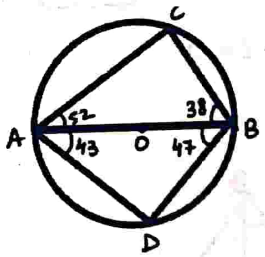


$CD = \sqrt{1024+420}$

$CD = \sqrt{1444}$

CD = 38 cm Ans

128.

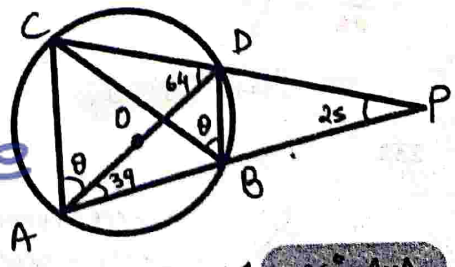


$\angle CAD = 95$

$\angle CBD = 85$

$\angle CAD - \angle CBD = 10°$ Ans

129.



$\theta = 90 - 64 = 26°$ Ans

130.

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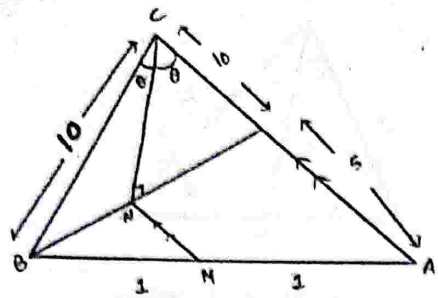
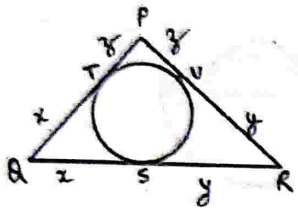


$MN = \frac{5}{2} = 2.5$ Ans

131.



Given,

$x+z = x+y+5$

$z = y+5$ ①

$x+z = z+y+2$

$x = y+2$ ②

$2(x+y+z) = 32$

$x+y+z = 16$

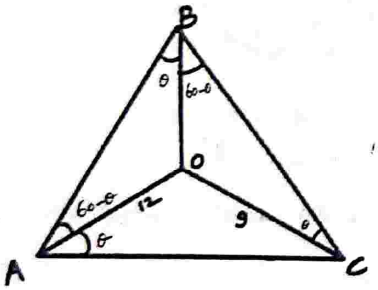
$2y+z+y = 16$

$y = 3$

$z = 8$

$PR = Y + Z = 11$

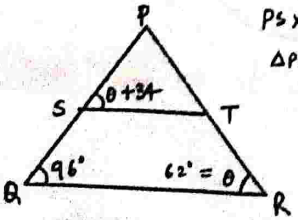
132.



$\frac{12}{OB} = \frac{OB}{9}$

$OB = \sqrt{12 \times 9} = 6\sqrt{3}$ Ans

133.



$PS \times PR = PQ \times PT$

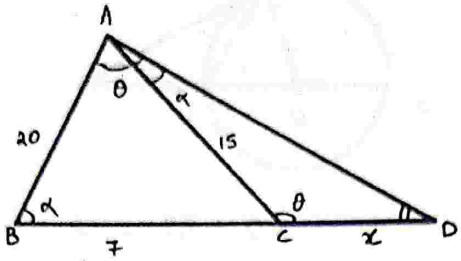
$\Delta PST \sim \Delta PQR$

$\theta + 34 = 96$

$\theta = 62$

$\angle QPR = 180 - 96 - 62 = 22°$ Ans

134.



$\frac{x}{AD} = \frac{15}{20} = \frac{AD}{7+x}$

$AD = \frac{4x}{3}$

$\frac{3}{4} = \frac{4x/3}{7+x}$

$x = 9$ Ans

135.

$A_1 \rightarrow$

$(n-2) \times 180 = 1080$

$n_{A_1} = 8$

$A_2 \rightarrow$

$I - E = 132$

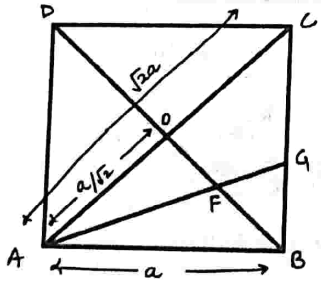
$I + E = 180$

$E = 24$

$n_{A_2} = \frac{360}{24} = 15$

$n_{A_1} + n_{A_2} = 23$ Ans

136.

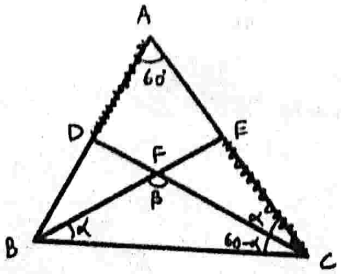


$\frac{AC}{AB} = \frac{CG}{GB} = \frac{\sqrt{2}}{1}$

$\frac{OF}{FB} = \frac{1}{\sqrt{2}}$

OF : GB = 1 : 2 Ans

137.

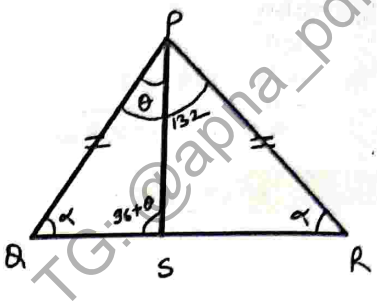


$\Delta DAC \cong \Delta ECB$

$\alpha + 60 - \alpha + \beta = 180°$

$\beta = 120°$ Ans

138.



$2\alpha = 180 - 132$

$\alpha = 24°$

$\Delta PQS, 2\theta + 96 + 24 = 180°$

$\theta = 30°$

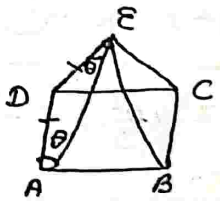
$\angle PSR = \alpha + \theta$

or

$180 - (96 + \theta)$

$= 54°$ Ans

139.



$AD = DE$

$\angle EDA = 90 + 60 = 150$

$2\theta = 180 - 150$

$\theta = 15°$

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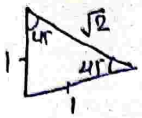
140.



$2+\sqrt{2} = 49$

$1 = \frac{49}{2+\sqrt{2}}$

$\text{Area} = \frac{1}{2} \times 1 \times 1 = \frac{1}{2} \times \left(\frac{49}{2+\sqrt{2}}\right)^2$

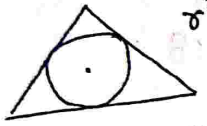
$= \frac{1}{2} \frac{(49)^2 (2-\sqrt{2})^2}{2^2}$

$= \frac{2401}{4 \times 2} \times (6-4\sqrt{2})$

$= \frac{2401 \times 0.34}{4 \times 2}$

Ans = 102.98

141.



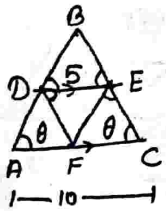
$r^2 = \left(\frac{a}{2\sqrt{3}}\right)^2 = \frac{a^2}{12}$

$\frac{\sqrt{3}}{4} \times a^2 - \pi r^2$

$\frac{1.732}{4} \times 64 - 3.14 \times \frac{64}{12}$

$= 10.97 cm^2$

142.



$\angle BDE = \angle BAC$ [11 line]

$\angle BED = \angle BCA = \theta$

$\angle CEF = \angle CBA$ [11 line]

$\therefore \angle EDF = \angle DEB$ [alternate angle]

$\because \angle FDE = \angle FED$

$DF = EF = 5cm$

143.

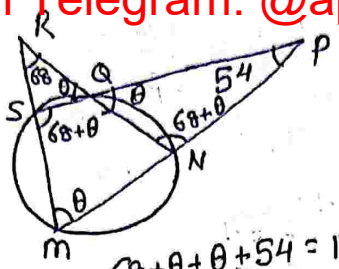
$x^2+y^2 > z^2$

Acute $\angle$ triangle.

$x^2+y^2 = z^2$ Right $\angle A$

$x^2+y^2 < z^2$ Obtuse $\angle A$

144.

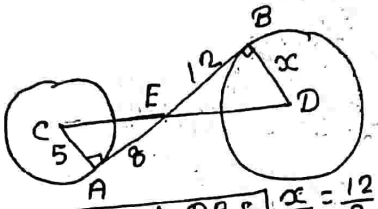


$68+\theta+\theta+54 = 180$

$\theta = 29$

$\angle SMN = \theta = 29°$

145.



$\triangle CAE \sim \triangle DBE$ $\frac{x}{5} = \frac{12}{8}$ $x = 7.5$

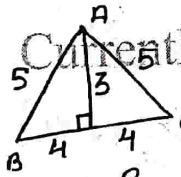
$CE = \sqrt{8^2+5^2} = 9.4$

$DE = \sqrt{12^2+7.5^2} = 14.15$

$CD = 14.15 + 9.4 = 23.55$

~ 23.58

146.



CurrentMUDDE

$\tan C = \frac{3}{4}$

$\cot B = \frac{4}{3}$

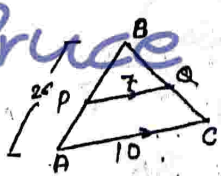
$\frac{3}{4} - \frac{4}{3} = -\frac{7}{12}$

147.

$2\pi r + 3 \times 2r$

$14\pi + 42$

148.



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$\frac{AB}{PB} = \frac{AC}{PQ}$

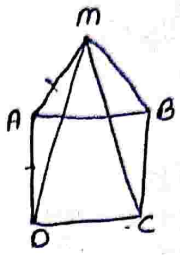
$\frac{26}{PB} = \frac{10}{7}$

$PB = 18.2$

$AP = 26 - 18.2$

$= 7.8$

149.



$\angle DAB = 90+60 = 150$

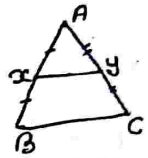
$\angle ADM = \angle BCM = 15°$

$\angle MCD = 90-15$

$= 75°$

Angle MDC = 75°

150.



$xy = \frac{BC}{2}$

$BC + \frac{BC}{8} = 24$

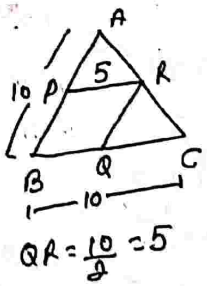
$BC = 16$

$xy = 8$

$BC - xy$

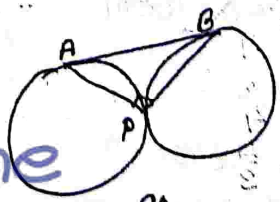
$= 8 cm$

151.



$QR = \frac{10}{2} = 5$

152.



$\angle APB = 90$

$\angle ABP = 90-40$

$= 50°$

153.

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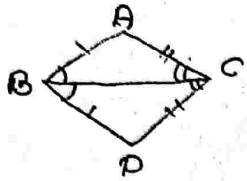
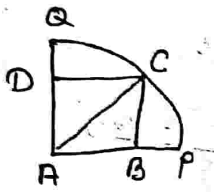


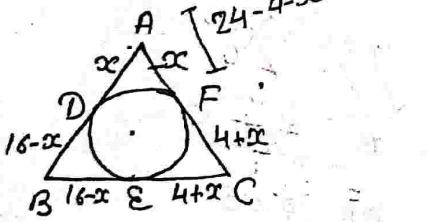
$\angle ABD = 58$
$\angle DBC = 2x-4 = 29$
$x = 33$
$\angle ACB = \angle DCB = 63$
$y+15 = 63$
$y = 48$
$2x+5y = 240+33$
$= 273$

154.



$r = 16\sqrt{2}$
Area $= \frac{1}{4} \times 3.14 \times 16 \times 16 \times 2 - 256$
$= 401.92 - 256$
$= 145.92 cm^2$

155.



$20-x = x$
$x = 10$
$AD = 10cm$

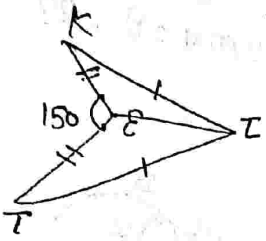
156.

$CD = AC$ $\angle ADC = ?$
$\angle CAD = \angle ADC = \frac{180-150}{2}$
$= 15°$

157.

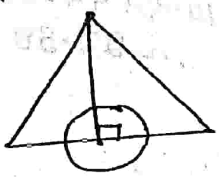
Formula $= \left(\frac{4\pi - 3\sqrt{3}}{6}\right) r^2$
$= \left(\frac{4\pi - 3\sqrt{3}}{6}\right) \times 30 \times 30$
$= 600\pi - 450\sqrt{3}\ cm^2$

158.



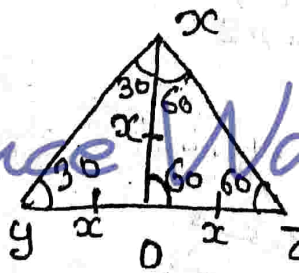
$\angle KET = 360-150$
$= 210$
$\angle TET = \frac{210}{2}$
$= 105°$

159.



$\frac{1}{2} ar\Delta - \frac{1}{4} ar\odot$
$\frac{1}{2} \times \frac{\sqrt{3}}{4} \times 6^2 - \frac{1}{4} \times \pi \times 1^2$
$= \frac{9\sqrt{3}}{2} - \frac{11}{14}$
$= \frac{1}{2}\left[9\sqrt{3} - \frac{11}{7}\right]$

160.

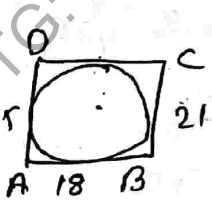


$\angle xyz = 30°$

161.

$AB = 9$
$BC = 11$
$AC = 20$
$AC = AB + BC$
$20 = 11 + 9$
$= 20$
A, B, C are Co-linear
no circle pass
$= 0$ dns

162.



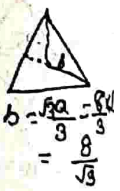
$18 + DC = 17 + 21$
$DC = 18$

163.

$n = \frac{360}{18} = 20$
Diagonal $= \frac{n(n-3)}{2}$
$= \frac{20 \times 17}{2} = 170$

164.

$h = \sqrt{a^2 - b^2}$
$= \sqrt{576 - \frac{64}{3}}$
$= \sqrt{\frac{1664}{3}}$
$l = \sqrt{h^2 + \left(\frac{8}{2\sqrt{3}}\right)^2}$
$= \sqrt{\frac{1664}{3} + \frac{16}{3}} = \sqrt{560}$



$TSA = \frac{1}{2} \times 24 \times \sqrt{560} + \frac{\sqrt{3}}{4} \times 8^2$
$= 12\sqrt{560} + 16\sqrt{3}$
$= 48\sqrt{35} + 16\sqrt{3}$

165.

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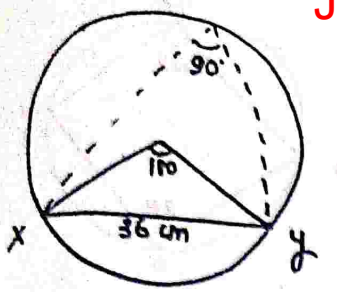


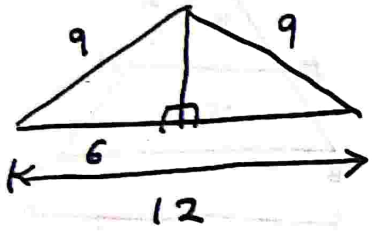
Circumference पर 90°

XY must be diameter

radius = 36/2

= 18 cm (Ans)

166.

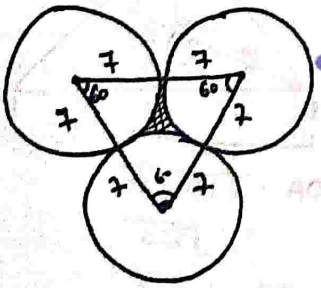


$R = \frac{ABC}{4\Delta}$

$= \frac{9 \times 9 \times 12}{4 \times \frac{1}{2} \times 12 \times 3\sqrt{5}}$

$\frac{27}{2\sqrt{5}} = \frac{27\sqrt{5}}{10}$

167.

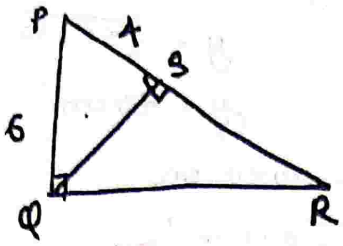


Shaded Part =
Ar. of triangle – Ar. of 3 sector

$\frac{\sqrt{3}}{4} \times 14 \times 14 - \frac{1}{2} \times \frac{22}{7} \times 7 \times 7$

$49\sqrt{3} - 77$ cm² (Ans)

168.

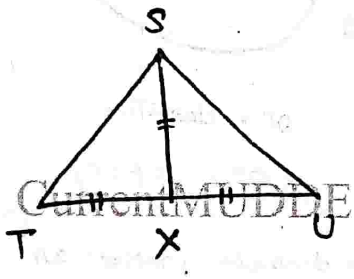


$QS^2 = 6^2 - 4^2$

$= \sqrt{20}$

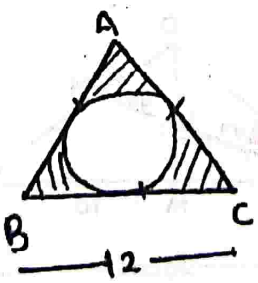
$QS = 2\sqrt{5}$ cm

169.



Angle TSU should be 90°

170.



$r = \frac{\Delta}{s}$

$r = \frac{\frac{\sqrt{3}}{4} \times 12 \times 12}{18}$

$(r = 2\sqrt{3})$

Shaded = Δ – 0 Area

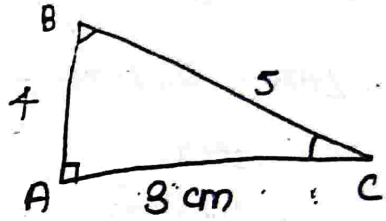
$= \frac{\sqrt{3}}{4} \times 12 \times 12 - \frac{22}{7} \times (2\sqrt{3})^2$

$= 36\sqrt{3} - 3.14 \times 4 \times 3$

$= 36 \times 1.732 - 3.14 \times 4 \times 3$

Shaded Area = 24.64 (Ans)

171.



$\cos B + \cot C$

$\frac{4}{5} + \frac{3}{4}$

$= \frac{16+15}{20} = \frac{31}{20}$

172.

$r = 9\sqrt{3}$

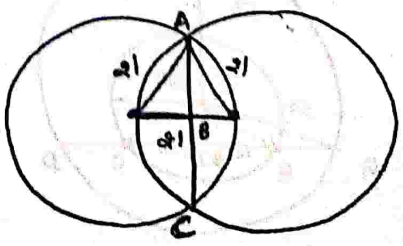
$a = \frac{a}{2\sqrt{3}} = 9\sqrt{3} \cdot \frac{a}{2\sqrt{3}}$

$(a = 54\text{cm})$

Perimeter = 54 × 3

= 162 cm (Ans)

173.



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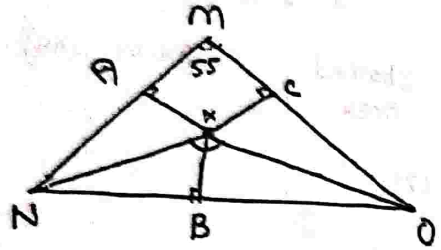
$AB = \frac{x\sqrt{3}}{2}$

$= \frac{21\sqrt{3}}{2}$

$AC = \frac{21\sqrt{3} \times 2}{2}$

$AC = 21\sqrt{3}$ cm

174.

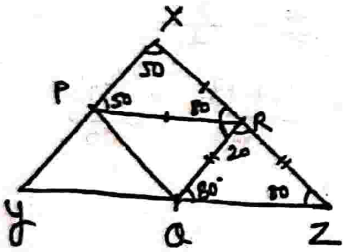


$\angle NXO = \frac{1}{2} \times \angle NMO$

$= 55° \times 2$

$= 110°$ (Ans)

175.

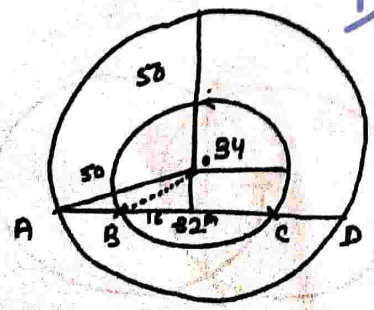


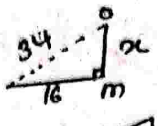
$\angle PRQ = 180° - [80° + 20°]$

$= 180° - 100°$

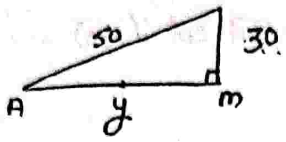
$\angle PRQ = 80°$ degree

176.





$x = 30°$



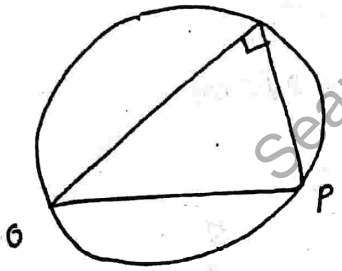
$y = \sqrt{50^2 - 30^2}$

$y = 40$ cm

$AD = 40 \times 2$ cm

$AD = 80$ cm Ans

177.



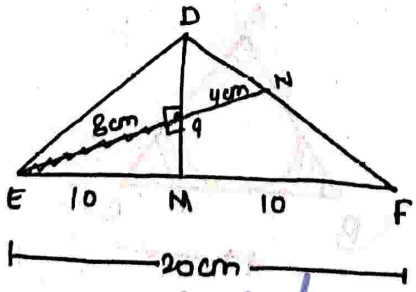
OP = diameter

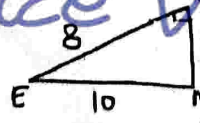
(OP = 44 cm)

CurrentMUDDE

diameter makes an angle of 90° on the Circumference of Circle.

178.

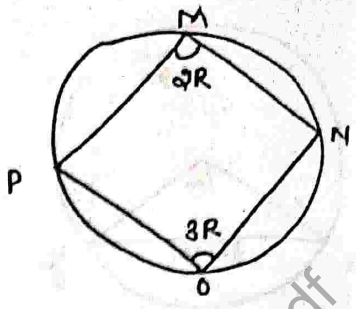




$DM = 3 \times 6$ cm

$= 18$ cm (Ans)

179.



$2\angle O = 3\angle M$

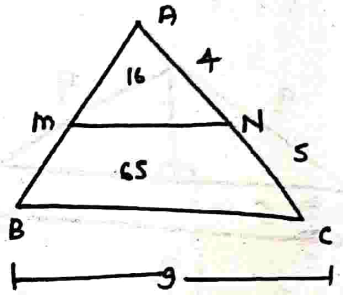
$\frac{2}{3} = \frac{\angle M}{\angle O}$

$5R = 180°$

$(R = 36°)$

$\angle M = 2 \times 36° = 72°$

180.



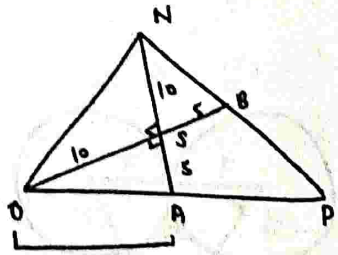
$MNBC = (81 - 16)\ R$

$= 65R \longrightarrow 130\ cm^2$

$\Delta MAN = \frac{130}{65} \times 16$

$\Delta MAN = 32\ cm^2$

181.



$OA = \sqrt{10^2 + 5^2}$

$= \sqrt{125}$

$OA = 5\sqrt{5}$

182.

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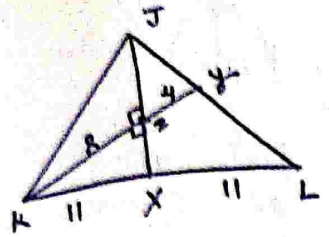
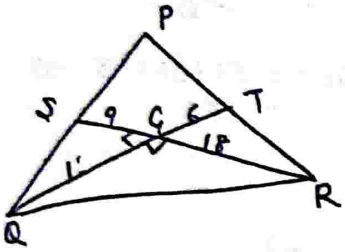


$ZX = \sqrt{11^2 - 8^2}$

$ZX = \sqrt{57}$

$JX = \frac{3\sqrt{57}}{1}$

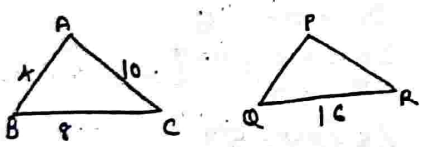
183.



$QS = \sqrt{9^2 + 12^2}$

$QS = 15\text{cm}$

184.



$\frac{BC}{QR} = \frac{8}{16} = \frac{1}{2}$

area ratio $= \frac{1}{4}$

Area of Triangle ABC =

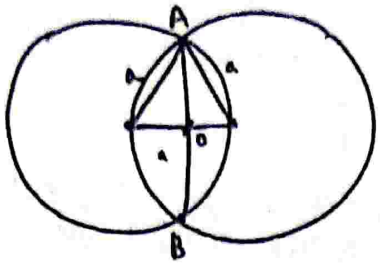
$\sqrt{S(S-a)(S-b)(S-c)}$

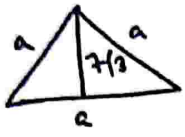
$\sqrt{11 \times 1 \times 3 \times 7}$

Δ ABC area $= \sqrt{231}$

Δ PQR area $= 4\sqrt{231}$

185.





$7\sqrt{3} = \frac{a\sqrt{3}}{2}$

(radius) $a = 14\text{cm}$

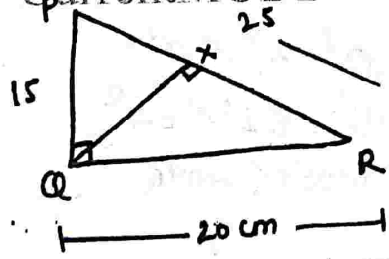
Sum of circumference

$2 \times \frac{22}{7} \times 14 \times 2$

176 cm (Any)

186.

CurrentMUDDE



$\frac{PX}{XR} = \frac{15 \times 15}{20 \times 20} = \frac{9}{16}$

187.

Bruce Wayne

$\Delta = \sqrt{S(S-A)(S-B)(S-C)}$

$\Delta = \sqrt{10 \times 1 \times 4 \times 5}$

$(\Delta = 10\sqrt{2})$

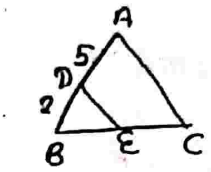
$R = \frac{ABC}{4\Delta}$

$= \frac{9 \times 8 \times 6}{4 \times 10\sqrt{2}}$

$R = \frac{27}{4\sqrt{2}}$

$\frac{27\sqrt{2}}{8}$

188.



$\Delta BED = 4$

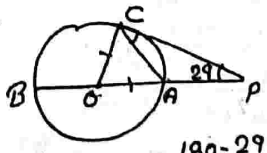
$\square ACED = 49 - 4 = 45$

$k = \frac{45-4}{45} \times 100$

$= \frac{41}{45} \times 100$

$= 91.1$

189.



$\angle OA = 180 - 29 - 90 = 61$

$\angle OCA = \angle OAC = \frac{180-61}{2} = 59.5$

$\angle ACP = 90 - 59.5 = 30.5$

190.

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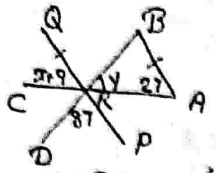


$\angle QBA = \angle CRQ$

$x + 9 = 27$

$x = 18$

$\angle CRD = y$

$x + 9 + y + 87 = 180$

$9 + 18 + 87 + y = 180$

$y = 66$

$y - 2x = 66 - 36$

$= 30$

191.

$\triangle XYZ \cong \triangle LMR$

$\frac{xy}{LM} = \frac{yz}{MR} = \frac{xz}{LR}$

$2m + 1 = 5$ $\quad 2x - 1 = 7$

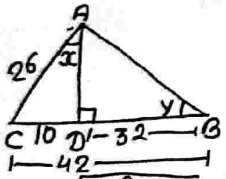
$m = 2$ $\quad x = 4$

$2p + 2 = 8$ $\quad p + m + x$

$p = 3$ $\quad = 3 + 2 + 4$

$= 9$

192.



$AD = \sqrt{26^2 - 10^2} = 24$

$AB = \sqrt{24^2 + 32^2} = 40$

$\cos x = \frac{24}{26}$, $\cos y = \frac{32}{40}$

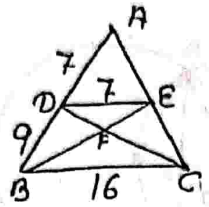
$\tan y = \frac{24}{32}$

$= \frac{6}{\frac{24}{26}} - \frac{5}{\frac{32}{40}} + 8 \times \frac{24}{32}$

$= \frac{26}{4} - \frac{25}{4} + \frac{24}{4}$

$= \frac{25}{4}$.

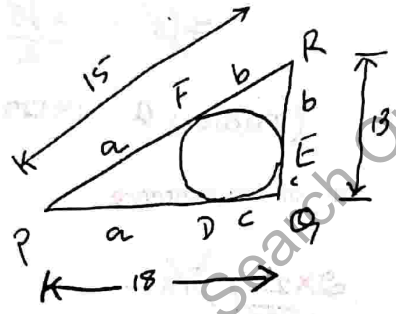
193.



$\frac{A(\triangle DEF)}{A(\triangle CBF)} = \left(\frac{DE}{BC}\right)^2 = \left(\frac{7}{16}\right)^2$

$= 49 : 256$

194.



$a + b + c = \frac{15 + 13 + 18}{2}$

$a + 13 = 23$

$a = 10$

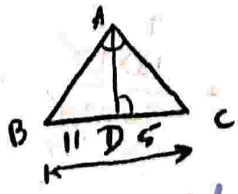
195. CurrentMUDDE

$a^2 + b^2 < c^2$

$15^2 + 62^2 < 64^2$

$4069 < 4096$

196.



$\triangle ABC \sim \triangle DAC$

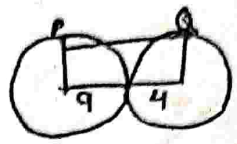
$\frac{BC}{AC} = \frac{AC}{DC}$

$\frac{16}{AC} = \frac{AC}{5}$

$AC^2 = 80$

$AC = 4\sqrt{5}$ cm

197.

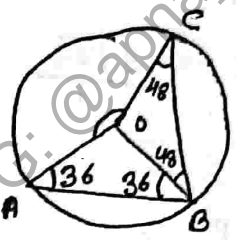


$PQ = \sqrt{13^2 - (9-4)^2}$

$= \sqrt{169 - 25}$

$= 12$

198.



$\angle AOC = 36 + 36 + 48 + 48$

$= 168°$

199.

$13^2 = D^2 - 121$

$D^2 = 296$

$D = \sqrt{296}$

200.

$\triangle PQR \cong \triangle MNY$

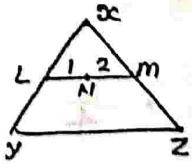
$PQ = MN = 8$

$\angle Q = 56$, $\angle P = 72$

$\angle R = 53$

$\angle R = \angle Y = 53$

201.



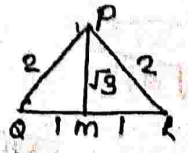
$LN = 5$

$NM = 10$

$LM = 15$

$YZ = 15 \times 2 = 30$

202.



by option

$3PQ^2 = 4PM^2$

203.

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Bruce Wayne
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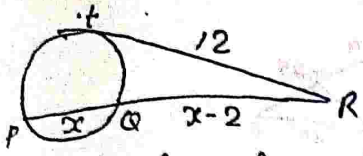


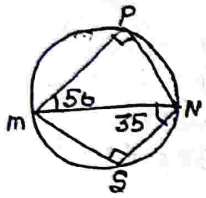
$12^2 = (x-2)(2x-2)$

$x^2 - 3x - 70 = 0$

$(x-10)(x+7) = 0$

$x = 10$.

204.



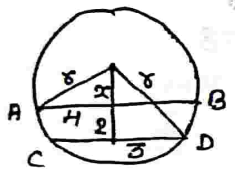
$\angle SmN = 90 - 35 = 55$

$\angle Pms = 50 + 55 = 105$

$\angle PNS = 180 - 105 = 75$

$\Rightarrow 105 - 75 \Rightarrow 30°$.

205.



$\gamma^2 = 4^2 + x^2$

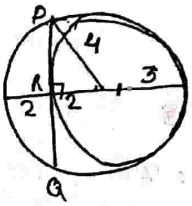
$\gamma^2 = 3^2 + (x+2)^2$

$16 + x^2 = 9 + x^2 + 4 + 4x$

$x = \frac{3}{4}$

$\gamma^2 = 16 + \frac{9}{16} = \frac{\sqrt{265}}{4}$

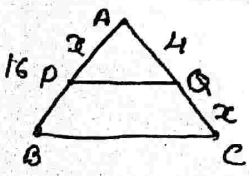
206.



$PR = \sqrt{16-4} = 2\sqrt{3}$

$PQ = 4\sqrt{3}$

207.



$\frac{x}{16-x} = \frac{4}{x}$

$x^2 = 64 - 4x$

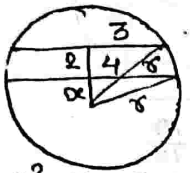
$x^2 + 4x - 64 = 0$

$\frac{-4 \pm \sqrt{16 + 256}}{2}$

$-2 \pm 2\sqrt{17}$

$= 8\sqrt{17} - 2$

208.



$\gamma^2 = x^2 + 16 = 9 + 4 + x^2 + 4x$

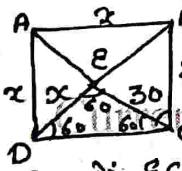
$4x = 9$

$x = \frac{3}{4}$

$\gamma = \sqrt{\frac{9}{16} + 16^2}$

$= \sqrt{265}/4$

209.



$\triangle BEC$ में $EC = BC = x$

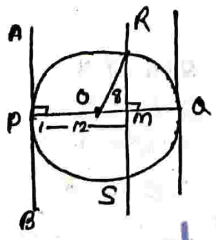
$\angle BCE = \angle EBC = \frac{180-30}{2} = 75$

इसी तरह, $\angle AED = 75$

$\angle AEB = 360 - (60 + 75 + 75)$

$= 150$

210.



$\angle RmP = \angle APm = 90°$

$OR = 8$

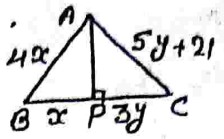
$Om = PM - OP$

$= 12 - 8 = 4$

$Rm = \sqrt{8^2 - 4^2} = 4\sqrt{3}$

$RS = 2 \times 4\sqrt{3} = 8\sqrt{3}$

211.

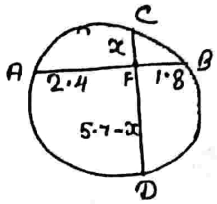


$\triangle APC \sim \triangle APB$

$\frac{5y+21}{4x} = \frac{3y}{x}$

$y = 3, x = 9$; $\therefore x + y = 12$.

212.



$2.4 \times 1.8 = x(5.7-x)$

$4.8 \times 0.9 = x(5.7-x)$

$x = 0.9$

खड़े की लंबाई $= 4.8$

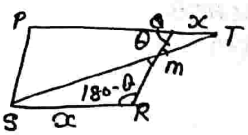
213.

रेखा की लंबाई $= \sqrt{d^2 - (r_1 - r_2)^2}$

$= \sqrt{121 - 9}$

$= 4\sqrt{7}$

214.



$SR = QT$

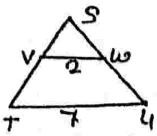
$\triangle QmT \sim \triangle PST$

$Qm = \frac{1}{2} PS$

$QT = \frac{1}{2} PT$

$PT = 2SR$

215.



$\triangle STU$ का क्षे० $= 7^2 = 49$

$\triangle SVW$ " " $= 2^2 = 4$

$\frac{\text{VWYT का क्षे०}}{\text{STU का क्षे०}} = \frac{45}{49}$

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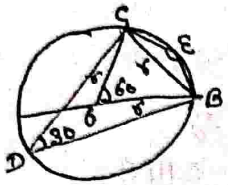
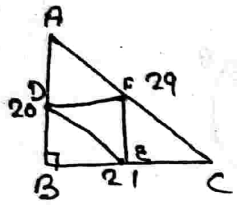
216.



$\angle COB = 60$
$\angle CDB = 30$
$\angle CEB = 180 - 30$
$= 150$

217.

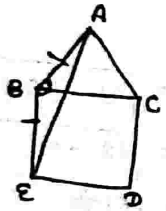


ΔABC का $\frac{1}{2} = \frac{1}{2} \times 20 \times 21$

ΔDEF " " $= \frac{1}{4} \times \frac{1}{2} \times 20 \times 21$

$= 52\frac{1}{2}$

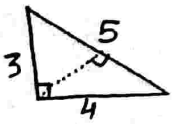
218.



$\angle ABE = 90 + 60 = 150$
$\angle BAE = \angle BEA = 15$

$\angle EAB + 3\angle AEB$
$= 15 + 3 \times 15$
$= 60$

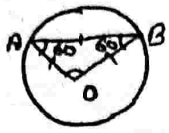
219.



$h_1 — 4$
$h_2 — 3$
$h_2 — \frac{3 \times 4}{5}$

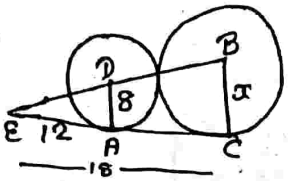
$h_1 : h_2 : h_3 = 4 : 3 : \frac{12}{5}$
$= 20 : 15 : 12$

220.



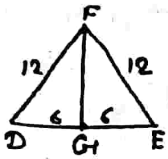
$arc\ ABC = \frac{\pi r \theta}{180}$
$= \frac{22}{7} \times \frac{21 \times 60}{180}$
$= 22$

221.



$\frac{x}{8} = \frac{18}{12}$
$x = 12$

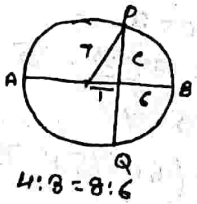
222.



$FG^2 = FD \times FE - DG \times GE$
$FG^2 = 12 \times 12 - 6 \times 6$
$= 6\sqrt{3}$

223

CurrentMUDDE



$4 : 8 = 8 : 16$

$PC = \sqrt{7^2 - 1^2} = 4\sqrt{3}$
$PQ = 2 \times 4\sqrt{3} = 8\sqrt{3}$

224.

2 5 7	$2+5=7$ X
5 7 8	$5+7>8$ ✓
7 8 2	$7+8>2$ ✓
8 2 5	$2+5<8$ X

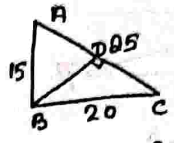
2

225.

$\angle CDE = \angle CAE$ (Same arc)

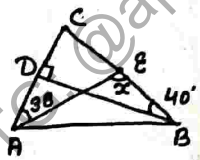
ΔAOC
$\angle O = 100$
$\angle A = \angle C = 40$
$\angle CDE = 40$
$\angle CEA = \frac{\angle AOC}{2}$
$= 50$
Sum $= 90$

226.



$BD = \frac{AB \times BC}{AC}$
$= \frac{15 \times 20}{25}$
$= 12$

227.

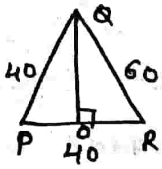


$\angle C = 90 - 40 = 50$
$x = 50 + 38 = 88$

228.

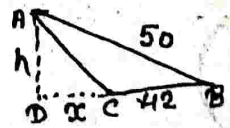
$AC = \sqrt{13^2 - 5^2} = 12$
$AE = \frac{12}{2} = 6$
$EB = \sqrt{10^2 - 6^2} = 8$
$ar\ ABCD = \frac{1}{2} \times 12 \times 8 + \frac{1}{2} 12 \times 5$
$= 78$

229.



$Area = \frac{1}{2} \times PR \times QO = \sqrt{S(S-a)(S-b)(S-c)}$
$= \frac{1}{2} \times 40 \times QO = \sqrt{70 \times 30 \times 30 \times 10}$
$QO = 15\sqrt{7}$

230.



$Area = \frac{1}{2} \times 42 \times h = 294$
$h = 14$
$BD = \sqrt{50^2 - 14^2} = 48$
$x = 6$
$AC = \sqrt{(14)^2 + 6^2} = \sqrt{232}$
$= 2\sqrt{58}$

231.

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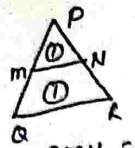
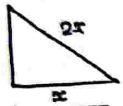


$\frac{ar\ PMN}{ar\ PQR} = \frac{1}{2}$

$\frac{PM}{PQ} = \frac{1}{\sqrt{2}}$

$\frac{MQ}{PQ} = \frac{\sqrt{2}-1}{\sqrt{2}}$

232.



$h = \sqrt{4x^2 - x^2} = \sqrt{3}x$

$\frac{1}{2} \times x \times \sqrt{3}x = 600$

$x^2 = \frac{1200}{\sqrt{3}}$

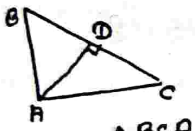
$= 400\sqrt{3}$

$x^2 = 400 \times 1.73$

$x = 26.3$

$2x - x = 26.3$

233.



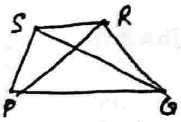
$\Delta ACD \sim \Delta BCA$

$\frac{AC^2}{BC^2} = \frac{7}{63}$

$BC^2 = 25 \times 9$

$BC = 15$

234.



$8(3x-15) = (x+9)(x-5)$

$x^2 - 11x + 36 = 0$

$-5 \quad -6$

$x = 5, 6$

$x_1 - x_2 = 11.$

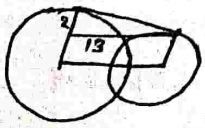
235.

Side = 12, 12, 12

Area = $\frac{\sqrt{3}}{4} \times 12 \times 12$

$= 36\sqrt{3}$

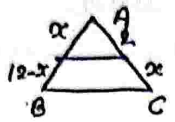
236.



$C.T = \sqrt{18^2 - 2^2}$

$= \sqrt{165}$

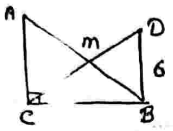
237.



$\frac{x}{12} = \frac{2}{x+2}$

$x = 4.$

238.



CD = 10

Cm = Dm = 5

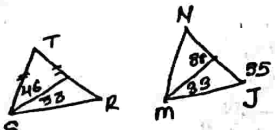
239.

$(18+R)^2 = (18-R)^2 + 12^2$

$324 + 36R + R^2 = 324 - 36R + R^2 + 144$

$R = 2$

240.

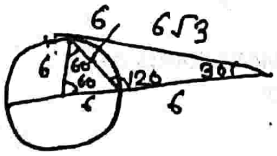


$STR \sim MNJ$

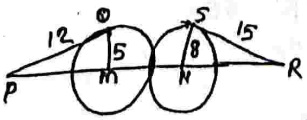
$55 \times \frac{7}{11} = R$

$R = 35$

241.



242.



PM = 9

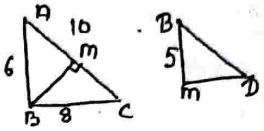
RN = 17

PR = 13 + 17 + 5 + 8

= 43

243.

244.

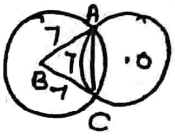


$\frac{Bm}{AB} = \frac{BD}{BC}$

$\frac{5}{6} = \frac{BD}{10}$

$BD = \frac{25}{3}$

245.



$ar\ ABC = \frac{\sqrt{3}}{4} \times 7^2 = \frac{49\sqrt{3}}{4}$

$AOCB = \frac{\pi \times 7 \times 7 \times 60}{360} = \frac{49\pi}{6}$

$AOC = \frac{49\pi}{6} - \frac{49\sqrt{3}}{4}$

$Common = 98\left(\frac{\pi}{6} - \frac{\sqrt{3}}{4}\right)$

246.

$(6-12) < a < (6+12)$

$6 < a < 18$

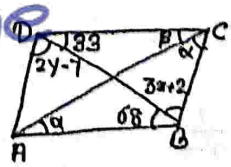
Isoceles either 6 or 12

12.

247.

It is always possible to draw a circle passing through 3 non-collinear points in a plane.

248.



$\Delta ADB \sim \Delta CDB$ (SAS)

$3x + 2 = 68$

$x = 22$

$2y - 7 = 33$

$y = 20$

$44 + 60 = 104.$

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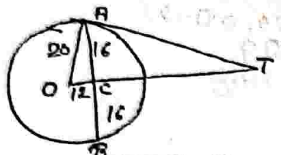
249.

angle by Semicircle = 90°

250.



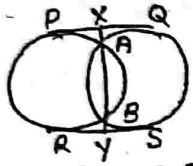
$OC = \sqrt{20^2 - 16^2} = 12$

$AT = \frac{AO \times AC}{OC}$

$= \frac{20 \times 16}{12} = \frac{80}{3}$

$= 26.67$

251.



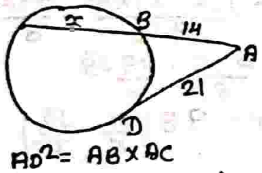
$xQ^2 = xA \cdot xB$

$= 1 \times 4$

$xQ = 2$

$PQ = 2 \times 2 = 4$

252.



$AD^2 = AB \times AC$

$21 \times 21 = 14(14 + x)$

$2x = 35$

$x = 17.5$

253.

$A = 60$

$B = 90$

$C = 30$

$\frac{1}{2} \times 0$

$= 0$

254.

$A - x+5$

$B - x$

$C - x-4$

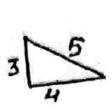
$\frac{1}{x+5} + \frac{1}{x} = \frac{1}{x-4}$

by option

$x = 10$

$A = 15$

255.



$r = 4, h = 3$

$V = \pi \times \frac{1}{3} \times 3 \times 4 \times 4$

$= 16\pi$

256.

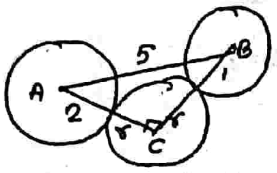
Area of $\Delta = \frac{\sqrt{3}}{4} \times 28 \times 28 = 196\sqrt{3}$

Area of $\bigcirc = \frac{22}{7} \times 14 \times 14 \times \frac{1}{2} = 308$

Diff = 339.08 − 308

= 31.08

257.



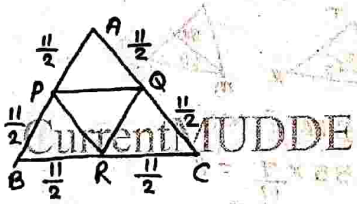
$(r+2)^2 + (r+1)^2 = 5^2$

$r^2 + 6r - 20 = 0$

$(r+5)(2r-4) = 0$

$r = 2$

258.



$\frac{\sqrt{3}}{4} \times \left(\frac{11}{2}\right)^2 = \frac{121\sqrt{3}}{16}$

259.

INFINITELY MANY POINTS OF INTERSECTION

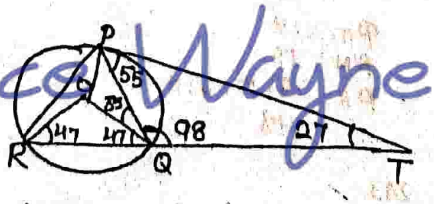
260.

Orthocenter.

So, 180 − 68

= 112.

261.



$\angle OPR = 90 - 55 = 35$

$\angle ROQ = 86$

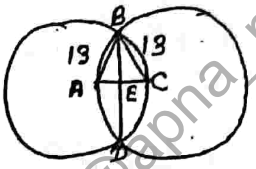
$\angle QOR = 47$

262.

$\angle ABC = x \angle BAC$

$x = \frac{60}{30} = 2$

263.

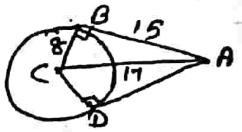


$BE = \frac{\sqrt{3}}{2} \times 13$

$BD = 2 \times \frac{\sqrt{3}}{2} \times 13$

$= 13\sqrt{3}$

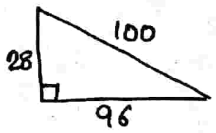
264.



Area $= \left(\frac{1}{2} \times 15 \times 8\right) \times 2$

$= 120$

265.

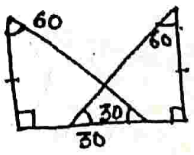


Circum $r = \frac{100}{2} = 50$

$\pi r^2 = 3.14 \times 50 \times 50$

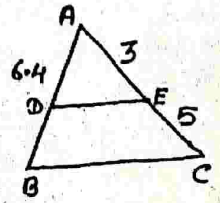
$= 7850.$

266.



60 : 30 = 2 : 1

267.



$\frac{3}{8} = \frac{AD}{6.4}$, $AD = 2.4$

$BD = 6.4 - 2.4$

$= 4$

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MENSURATION

CGL PRE 2018

Q1. How much iron sheet (in m^2) will be needed to construct a rectangular tank measuring 10m × 8m × 6m, if a circular opening of radius 1 m is to be left at the top of the tank (correct to one decimal) ?
(a) 371.6 (b) 372.9 (c) 370.4 (d) 370.8

Q.2 The radii of three concentric circles are in the ratio of 4:5:7. What is the ratio of the area between the two inner circles to that between the two outer circles?
(a) 4:7 (b) 5:9 (c) 4:5 (d) 3:8

Q.3 The length of the metallic pipe is 7.56m. Its external & internal radii are 2.5cm & 1.5cm respectively. If 1 cm^3 of the metal weight 7.5g, then the weight of the pipe is (given π = 22/7):
(a) 72.82kg (b)70.14 kg (c)71.28 kg (d)69.28 kg

Q.4 The radius of a sphere is reduced by 40%. By what percent will its volume decrease?
(a) 60% (b) 64% (c) 72.5% (d) 78.4%

CHSL 2018

Q.5 The area of a field in the shape of a hexagon is $2400\sqrt{3}$ Sq. metre. What will be the cost of fencing it at Rs. 18.50 per metre?
(a) 4440 (b) 5920 (c) 5550 (d) 5180

Q.6 A wire is in the shape of a rectangle whose side are in the ratio 7:4. It was initially in the shape of a circle of radius, very nearly equal to 31.5cm. The length of the smaller side of the rectangle is: (given π = 22/7)
(a) 44cm (b) 36 cm (c) 40 cm (d) 32 cm

Q.7 Twelve sticks each of length unit are used to form an equilateral triangle. The area of triangle is?
(a) $3\sqrt{3}$Sq. units (b) $2\sqrt{3}$ Sq. units
(c) $4\sqrt{3}$ Sq. units (d) $8\sqrt{3}$ Sq. units

Q.8 Equilateral triangles are drawn on the hypotenuse and one of the perpendicular sides of a right angled isosceles triangle. Their areas are H & A respectively. Then A/H is?
(a) ¼ (b) ½ (c) $1/\sqrt{2}$ (d) $1/2\sqrt{2}$

Q.9 The area of a sector of a circle with central angle 60^0 is A. Then circumference of the circle is C. Then A is equal to?
(a) $C^2/6\pi$ (b) $C^2/18\pi$ (c) $C^2/24\pi$ (d) $C^2/4\pi$

CPO 2018

Q.10 The radius of a cylinder is increased by 120% & its height is decreased by 40%. What is the percentage increase in its volume?
(a) 180.6% (b) 212.8% (c) 190.4% (d)175.4%

Q.11 A Square cardboard with side 3m is folded through one of its diagonal to make a triangle, the height of the triangle is?
(a) $3/\sqrt{2}$ (b) $2\sqrt{3}$ (c) $3\sqrt{2}$ (d) $2/\sqrt{3}$

Q.12 The unequal side of an isosceles triangle is 2cm. The median drawn to the equal sides are perpendicular. The area of the triangular is?
(a) 2cm^2 (b) 3 cm^2 (c)5 cm^2 (d)1 cm^2

Q.13 The liquid in a container is sufficient to paint an area of 11.28 m^2. How many boxes of dimension 30cm × 25cm × 12cm can be painted with the liquid in this container?
(a) 40 (b) 24 (c) 32 (d) 12

Q.14 A River is 3m deep and 36m wide flows at the rate of 5km/h into sea. The volume of water that runs into the s4ea per minute is?
(a) 8300 (b) 9000 (c) 7600 (d) 6400

Q.15 The sides of a triangle are 8cm, 15cm & 17cm respectively. At each of its vertices, a circle of radius 3.5cm is drawn. What is the area of the triangle excluding the portion covered by the sectors of the circles? (π = 22/7).
(a) 23.5cm^2 (b) 21.5 cm^2 (c) 47 cm^2 (d) 40.75 cm^2

Q.16 The area of each Square of a chessboard having 64 squares is 4cm^2. If there is a border on all the sides of the chessboard of 2cm, then the perimeter of the chessboard is?
(a) 128cm (b) 80cm (c) 70cm (d)256cm

Q.17 Original breadth of a rectangular box is 20cm. The box was then remade in such a way that its length increased by 30% but the breadth is decreased by 20% and the area increased by 100cm^2. What is the new area of the box?
(a) 2500 cm^2 (b) 2200 cm^2 (c) 2600 cm^2 (d)2400 cm^2

Q.18 The dimensions of a swimming pool are 66m × 35m × 3m. How many hours will it take to fill the pool by a pipe of diameter 35cm with water flowing at speed 8m/s?
(a) 2.75 h (b) 3.5h (c) 2.5h (d) 3.5h

Q.19 A swimming pool is 40m in length, 30m in breadth & 2.2m in depth. The cost of cementing its floor and the four sides at Rs 25 / m^2 is?
(a) 43980 (b) 37540 (c) 34260 (d) 37700

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Q.20 The volume of a conical tent is 924m³ and its area is 154m². The height of the tent is ?
(a) 24 (b) 6 (c) 18 (d) 12

Q.21 A diagonal of a quadrilateral is 40 cm. The length of the perpendicular to the opposite ends is 7.5cm & 8.6cm. What is the area of quadrilateral?
(a) 434cm² (b) 322 cm² (c) 368 cm² (d) 288 cm²

Q.22 How much volume will the wood need to make a closed box of 2.5cm thickness with outer measurements 90cm × 75cm × 50cm?
(a) 46720cm³ (b) 69750 cm³
(c) 49050 cm³ (d) 36170 cm³

CGL MAINS 2018

Q.23 The radius & the height of the right circular cone are in the ratio of 5:12. Its curved surface area is 816.4 cm². What is the volume (in cm³) of the cone? (π =3.14)
(a) 2512 (b) 1256 (c) 3140 (d) 628

Q.24 The base of the right pyramid is an equilateral triangle with area $16\sqrt{3}$ cm². If the area of one of its lateral face is 30cm², then its height is ?
(a) $\sqrt{\frac{739}{12}}$ (b) $\sqrt{\frac{209}{12}}$ (c) $\sqrt{\frac{611}{12}}$ (d) $\sqrt{\frac{643}{12}}$

Q.25 A Sphere of maximum volume is cut out from a solid hemisphere. What is the ratio of the volume of the sphere to that of the remaining solid?
(a) 1:4 (b) 1:2 (c) 1:3 (d) 1:1

Q.26 A solid cylinder of base radius 12cm & height 15cm is melted & recast into N toys each in the shape of a right circular cone of height 9cm mounted on a hemisphere of radius 3cm. The value of N is?
(a) 27 (b) 64 (c) 48 (d) 54

Q.27 The internal diameter of a hollow hemispherical vessel is 24cm. It is made of a steel sheet which is 0.5cm thick. What is the total surface area (in cm²) of the vessel?
(a) 612.75π (b) 468.75π (c) 600.2π (d) 600.5 π

Q.28 A sector of radius of 10.5cm with central angle 120⁰ is folded to form a cone by joining the two bounding radii of the sector. What is the volume (cm³) of the cone so formed?
(a) $\frac{343\sqrt{2}}{6}\pi$ (b) $\frac{343\sqrt{3}}{6}\pi$ (c) $\frac{343\sqrt{3}}{12}\pi$ (d) $\frac{343\sqrt{2}}{12}\pi$

Q.29 A right circular cylinder of maximum volume is cut out from a solid wooden cube. The material left is what percent of the volume (nearest to an integer) of the original cube?
(a) 19 (b) 28 (c) 23 (d)21

Q.30 The internal & external radii of a hollow hemispherical vessel are 6cm & 7cm respectively. What is the total surface are (in cm²) of the vessel?
(a) 183 π (b) 189π (c) 177 π (d) 174 π

Q.31 A cylindrical vessel of radius 3.5m is full of water. If 15400 litres of water is taken out from it, then the drop in the water level in the vessel will be:
(a) 72cm (b) 40cm (c) 35cm (d) 60cm

Q.32 A solid cube is cut into three cuboids of same volumes. What is the ratio of the surface area of the cube to the sum of the surface areas of any two of the cuboids so forms?
(a) 9:10 (b) 27:16 (c) 27:10 (d) 9:8

Q.33 A field roller, in the shape of a cylinder has a diameter of 1m & length of $1\frac{1}{4}$ m. If the speed at which the roller rolls is 14 revolutions per minute, then the maximum area (in m²) that it can roll in 1 hour is: (π = 22/7)?
(a) 3960 (b) 3560 (c) 3300 (d) 3600

MTS 2019

Q.34 0.1 percent of 1.728×10^6 Spherical droplets of water, each of diameter 2mm, coalesce to form a spherical bubble. What is the diameter (in cm) of the bubble?
(a) 1.2 (b) 1.6 (c) 1.8 (d) 2.4

Q.35 The length of a cuboid is double of its breadth & its height is half of its breadth. If the height of the cuboid is 2cm, then what will be the edge of a cube whose volume is the same as that of the cuboid mentioned above?
(a) 4 (b) 6.4 (c) 8 (d) 7.2

Q.36 A ribbon of equal width & length L is wrapped around the curved surface of a right circular cylinder to cover it completely. If the base circumference of the cylinder is c, then how many times the ribbon was wrapped around the cylinder?
(a) $\frac{l}{4c}$ (b) $\frac{l}{c}$ (c) $\frac{l}{2c}$ (d) $\frac{2l}{c}$

Q.37 A cuboid of size 100cm × 80cm × 60cm cut into eight identical parts by three cuts. hat is the total surface area (in surface cm) of all eight parts?
(a) 22500 (b) 84100 (c) 50750 (d) 75200

Q.38 A hall with dimensions 25 metres long and 15 metres broad is surrounded by a path of uniform width of 3.5 metres. Find the cost of flooring the path at the rate of Rs. 25.50 per square metre.
(a) 8389.50 (b) 4186.50
(c) 8146.50 (d) 9149.50

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Q.39 If two cubes, each having the side 10mm, are put in a box containing 200 cubic centimetre water, then what will be the volume of the material (in ml) in the box?
(a) 201 (b) 202 (c) 200002 (d) 200001

Q.40 A solid cube each of whose face diagonal $128\sqrt{2}$ cm is moulded to make a cuboid. The length & the breadth of the cuboid are 512cm & 160cm respectively. What is the height of the cuboid?
(a) 16 (b) 20.8 (c) 25.6 (d) 16.4

Q.41 The volume of right circular cylinder is 3times the volume of a right circular cone. The radius of the cone & the cylinder are 3cm & 6cm respectively. If the height of the cylinder is 1cm, then what is the slant height of the cone?
(a) $\sqrt{13}$ cm (b) 4cm (c) 5cm (d) $\sqrt{15}$ cm

CPO 2019

Q.42 A circle is inscribed in an equilateral triangle of side 24cm. What is the area (in cm^2) of a square inscribed in the circle?
(a) 48 (b) 72 (c) 96 (d) 54

Q.43 A right circular cone of largest volume is cut from a solid wooden hemisphere. The remaining material is what percentage of the volume of the original hemisphere?
(a) 50% (b) $33\frac{1}{3}$% (c) 75% (D) $66\frac{2}{3}$%

Q.44 If the perimeter of an isosceles triangle is $(16\sqrt{2} + 16)$ cm, then the area of the triangle is?
(a) 76cm^2 (b) 64 cm^2 (c) 58 cm^2 (D) 66 cm^2

Q.45 The volume of a tank is 72 m^3. Water is poured into it at the rate of 60 ltr/minute. How much time will it take to fill the tank?
(a) 6hr (b) 12 hr (c) 20 hr (d) 10 hr

Q.46 The total surface area of a solid cylinder is 1155cm^2. Its curved surface area is equal to 2/5 of its total surface area. What is the height of the cylinder? (π=22/7)
(a) 7cm (b) 5 cm (c) 6 cm (d) 10.5 cm

MTS 2019

Q.47 A cube of the maximum possible volume is removed from a solid wooden sphere of radius 6 cm. The side of the cube is?
(a) $4\sqrt{3}$ (b) $3\sqrt{3}$ (c) $6\sqrt{3}$ (d) $2\sqrt{3}$

Q.48 A rectangular lawn whose length is twice of its breadth is extended by having four semi-circular portions on its sides. What is the total cost of levelling the entire lawn at rate of 100 per m^2 if the smaller side of the rectangular lawn is 12m.(π =3.14)
(a) 85320 (b) 86540 (c) 78650 (d) 97625

CHSL 2020

Q.49 If 3.96 dm^3 of the lead is to be drawn into a cylindrical wire of diameter 0.6cm, then the length of the wire (in m)?
(a) 130m (b) 125m (c)140m (d) 120m

MTS 2019

Q.50 The area of a circular ground is approximately equal to the $73\frac{1}{3}$% of the area of a triangular ground with sides 400m, 420m & 580m. What is the circumference (in m) of the circular ground? (π = 22/7)
(a) 880m (b) 440m (C) 1056m (d) 528m

Q.51 The height of a cone is equal to its base radius & its volume is 72π cm^3. What is its curved surface area (in cm^2)?
(a)$72\sqrt{2}$ π (b)$36\sqrt{2}$ π (c)$48\sqrt{2}$ π (d)$54\sqrt{2}$ π

Q.52 A wire, is in the form of a circle, encloses an area 3118.5 cm^2. It is now bent of form a rectangle whose length & breadth are very nearly in the ratio 7:4. The length of the rectangle, in cm is? (π=22/7)
(a) 56 (b) 49 (c) 7 (d) 63

Q.53 The height of right circular cone is 35cm & the area of its curved surface is four times the area of its base. What is the volume of the cone (in m^3 and correct up to 3 decimal places)?
(a) 3.316 (b) 3.384 (c) 2.994 (d) 2.625
CPO 9 Dec 2019

Q.54 60 discs each of diameter 21cm and thickness of 1/3cm are stacked one above the other to form a right circular cylinder. What is the volume (in m^3) (π = 22/7)?
(a) 4.25×10^{-2} (b) 8.05×10^{-3}
(c) 7.62×10^{-2} (d) 6.93×10^{-3}
CPO 9 Dec 2019

CGL MAINS 2019

Q.55 The height of a solid cylinder is 30 cm and the diameter of its base is 10 cm. Two identical conical holes each of radius 5 cm and height 12 cm are drilled out. What is the surface area (in cm^2) of the remaining solid?
(a) 230π (b) 430 π (c)330 π (d)120 π

Q.56 A spherical metallic shell with 6cm external radius weights 6688g, What is the thickness of the shell if the density of the metal is 10.5g per cm^3? (π=22/7)

(a) 2cm (b) 3cm (c) $2\frac{1}{2}$ cm (d) 4cm

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Q.57 If the radius of a sphere is increased by 2.5 dm, then its surface area increased by 110 dm^3. What is the volume (in dm^3) of the sphere? ($\pi = 22/7$)
(a)3/7 (b)11/21 (c)13/21 (d)4/7

Q.58 A hemispherical tank full of water is emptied by a pipe at the rate of 7.7 litres per seconds. How much time (in hrs) will it take to empty 2/3rd part of the tank, if the internal radius of the tank is 10.5m?
(a) 185/3 (b) 175/3 (c) 185/6 (d) 175/2

Q.59 A solid metallic cuboid of dimensions 18cm × 36cm × 72cm is melted & recast into 8 cubes of the same volume. What is the ratio of the total surface area of the cuboid to the sum of the lateral surface area of all 8 cubes?
(a) 2:3 (b) 4:7 (c) 7:8 (d) 7:12

Q.60 From a solid cylinder wooden block of height 18cm & radius 7.5cm, a conical cavity of same radius & same height is taken out. What is total surface area (in cm^2) of the remaining solid?
(a) 416.25 π (b) 270 π (c) 472.5 π (d) 326.25 π

Q.61 A right circular cylinder of maximum possible size is cut out form a solid wooden cube. The remaining material of the cube is what percentage of the original cube? (π = 3.14)
(a)22.4 (b)21.5 (c)22.8 (d)21.8

CPO 13 Dec 2019

Q.62 The radius & height of a right circular cone are in the ratio 1:2.4 If its curved surface area is 2502.5 cm^2, then what is its volume? (π=22/7).
(a)8085cm^3 (b)8820 cm^3
(c)11550 cm^3 (d)13475cm^3

CPO 13 Dec 2019

SSC CGL PRE 21

Q63. A solid cube of side 8 cm is dropped into a rectangular container of length 16 cm, breadth 8 cm and height 15 cm which is partly filled with water. If the cube is completely submerged, then the rise of water level (in cm) is:
a) 5 b) 2 c) 4 d) 6

Q64. The width of the path around a square field is 4.5 m and its area is 105.75m^2. find the cost of fencing the path at the rate of Rs100 per metre.
a) Rs400 b) Rs600 c) Rs550 d) Rs275

Q65. If the length of a diagonal of a square is (a + b), then the area of the square is:
a) a^2+b^2+2ab b) $\frac{1}{2}(a^2+b^2)$ c) a^2+b^2 d) $\frac{1}{2}(a^2+b^2)+ab$

Q66. A cylindrical vessel of diameter 32 cm is partially filled with water. A solid metallic sphere of radius 12 cm is dropped into it. What will be the increase in the level of water in the vessel (in cm)?
a) 9 b) 72 c) 27 d) 2.25

Q67. Let x cm^2 be the surface area and y cm^3 be the volume of a sphere such that y = 14x. what is the radius (in cm) of the sphere?
a) 102 b) 42 c) 51 d) 68

Q68. The curved surface area of a right circular cylinder is 616 cm^2 and the area of its base is 38.5 cm^2. what is the volume (in cm^3) of the cylinder? ($take\ \pi = \frac{22}{7}$)
a) 1155 b) 1408 c) 1243 d) 1078

Q69. The base of a triangle is increased by 40%. By what percentage (correct to two decimal places) should its height be increased so that the area increased by 60%?
a) 14.29% b) 20.01%
c) 15.54% d) 18.62%

Q70. A hemispherical depression of diameter 4 cm is cut out from each face of a cubical block of sides 10 cm. find the surface area of the remaining solid (in cm^2). (use$\pi = \frac{22}{7}$)
a) $900\frac{4}{7}$ b) $112\frac{4}{7}$
c) $675\frac{3}{7}$ d) $713\frac{1}{7}$

Q71. A 22.5 m high tent is in the shape of a frustum of a cone surmounted by a hemisphere. If the diameter of the upper and the lower circular ends of the frustum are 21 m and 39 m, respectively, then find the area of the cloth (in m^2) used to make the tent (ignoring the wastage). (use $\pi = \frac{22}{7}$)
a) $787\frac{2}{7}$ b) $2107\frac{2}{7}$
c) $2800\frac{2}{7}$ d) $1635\frac{6}{7}$

Q72. A solid cone of radius 7 cm and height 7 cm was melted along with two solid spheres of radius 7 cm each to form a solid cylinder of radius 7 cm. what is the curved surface area (in cm^2) of the cylinder? (use $\pi = \frac{22}{7}$)
a) 924 b) 880
c) 2196 d) 482

SSC MTS 2020

Q73. The material of a sphere of radius r is melted and recast into a hollow cylindrical shell of thickness a and outer radius b. what is its length assuming that no material is lost in recasting?
(a) $\frac{4r^3}{3a(2b-a)}$ (b) $\frac{4r^2}{3a(b+a)(b-a)}$
(c) $\frac{4r^2}{3a(b+a)(b+a)}$ (d) $\frac{4r^2}{3a(b-a)(b-a)}$

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Q74. Two similar cylindrical jugs have heights 5 cm and 8 cm, respectively. If the capacity of the smaller jug is 64 cm^3, what is the capacity (correct to 2 decimal places, in cm^3) of the larger jug?
(a) 163.84 (b) 262.14 (c) 294.54 (d) 102.40

Q75. If the internal dimensions of a rectangular closed wooden box are 30 cm, 18 cm and 23 cm, what space (in cm^3) will it occupy, if the wood used is 1 cm thick?
(a) 12420 (b) 9408 (c) 16000 (d) 14136

Q76. A rectangular plot is 420 m long and 84 m wide. It is surrounded by semi-circular flower beds along all its sides. The area of the entire plot (in hectares) is x. The value of x (correct to one decimal place) is (take $\pi = \frac{22}{7}$):
(a) 19.1 (b) 19.4 (c) 18.7 (d) 17.9

SSC CGL MAINS 2020

Q77. Three sides of a triangle are $\sqrt{a^2+b^2}, \sqrt{(2a)^2+(b)^2}$ and $\sqrt{a^2+(2b)^2}$ units. What is the area (in unit squares) of the triangle?
(a) $\frac{5}{2}ab$ (b) $3ab$ (c) 4ab (d) $\frac{3}{2}ab$

Q78. The base of a right pyramid is a square of side 8√2 cm and each of its slant edge is of length 10 cm. What is the volume (in cm3) of the pyramid?
(a) 256 (b) 224 (c) $426\frac{2}{3}$ (d) $96\sqrt{2}$

Q79. The curved surface area of a right circular cone is 2310 cm2 and its radius is 21cm. If its radius is increased by 100% and height is reduced by 50%, then its capacity (in litres) will be (correct to one decimal place): (Take $\pi = \frac{22}{7}$)
(a) 27.8 (b) 28.2 (c) 26.7 (d) 25.9

Mains 21

Q80. The base of a prism is a right triangle whose sides are 9cm, 12 cm and 15 cm. Volume of this prism is 648 cm^3. What will be the height of prism?
a) 16 cm b) 12 cm c) 14 cm d) 9 cm

DP 2022

Q80. The area of a sector of a circle of radius 18 cm is 54π cm^2. find the length of the corresponding arc of the sector.
a) 6π cm b) 5π cm c) 8π cm d) 7π cm

Q81. A wall 12 m long, 9 m high and 90 cm thick is to be constructed. Given that one pack contains 450 bricks, how many packs of bricks will be required if each brick is of dimensions 10 cm x 7.5 cm x 7 cm and the cement and sand mixture occupies one-eighteenth volume of the wall ? (Rounded off to the nearest integer)
a) 387 b) 388 c) 389 d) 390

Q82. Metal spheres, each of radius 1 cm are packed in a rectangular box of dimensions 12 cm x 4 cm x 4 cm. when 24 spheres are packed, the box is filled with preservative liquid. What is the volume (in cm^3, rounded off to 1 decimal place) of the liquid?
a) 192 b) 101 c) 91.4 d) 87.5

Q83. Find the volume of the cylinder circumscribing a sphere with the base diameter 28 cm (use π = 22/7).
a) 17248 cm^2 b) 17250 cm^3
c) 17244 cm^3 d) 17246 cm^3

Q84. What is the volume (in cm^3, rounded off to the nearest integer) of a frustum of a cone with diameters 70 cm and 42 cm of its two end a depth of 50 cm? (take π / 22/7)
a) 1,27,560 b) 1,25,767
c) 1,64,265 d) 1,56,810

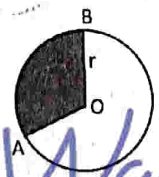
Q85. The perimeter of a sector of a circle of radius 8.2 cm is 22.4 cm. The area of the sector is:
a) 24.6 cm^2 b) 14.2 cm^2
c) 49.2 cm^2 d) 32.8 cm^2

CPO PRE 22

Q86. A field is in the shape of a rectangle of length 90 m and breadth 75 m. In one corner of the field, a pit, which is 18 m long 15 m broad and 6 m deep, has been dug out. The earth taken out of it is evenly spread over the remaining part of the field. Find the rise in the level of the field?
a) 27 cm b) 25 cm c) 28 cm d)120 cm

Q87. Find the perimeter of major sector of a circle of radius 12 meters, whose minor sector subtends an angle of 75° at the centre.
a) 24 + 5π meters b) 24 + 19π meters
c) 24 – 5π metersd) 24 – 19π meters

Q88. In the given figure, the length of arc AB is equal to twice the length of radius r of the circle. Find the area of sector OAB in terms of the radius r.



a) 3r b) 2r c) πr^2 d) r^2

Q89. A cylinder of height 8 cm and radius 6 cm is melted and converted into 3 cones of the same radius and height that of cylinder. Determine the total curved surface area of cones.
a) 180π cm^2 b) 60 π cm^2
c) 144 π cm^2 d) 120 π cm^3

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Q90. The heights of two right circular cones are in the ratio 1 : 5 and the perimeter of their bases are in the ratio 5 : 3. Find the ratio of their volumes.
a) 8 : 11 b) 7 : 6 c) 5 : 9 d) 3 : 4

Q91. The area of the sector of a circle is 128 cm^2. If the length of the arc of that sector is 64 cm, then find the radius of the cirlcle.
a) 4 cm b) 8 cm c) 2 cm d) 16 cm

Q92. The length of a cold storage is 5 times its breadth, and its height is 8 m. The area of its four walls (including the doors) is 720 m^2. find the total surface area of cold storage.
a) 1290.6 m^2 b) 1275.3 m^2
c) 1265.25 m^2 d) 1282.5 m^2

Q93. Three metallic spheres of radii 10 cm, 8 cm and 6 cm, respectively, are melted to from a single solid cone of radius 12 cm. find the curved surface area of the cone, correct to two places of decimal. (take $\pi = 3.14$)
a) 1664.50 cm^2 b) 1669.86 cm^2
c) 1876.79 cm^2 d) 1864.41 cm^2

Q94. As shown in the given figure, inside the large semicircle, three semicircle (with equal radii) are drawn so that their diameters all sit on the large semicircle's diameter. What is the ratio between the red and blue areas?

a) 4 : 3 b) 1 : 2 c) 2 : 1 d) 3 : 4

Q95. A cylinder of height 8 cm and radius 6 cm is melted and converted into 3 cones of the same radius and height that of cylinder. Determine the total curved surface area of cones.
a) 180π cm^2 b) 60π cm^2
c) 144π cm^2 d) 120π cm^2

CGL PRE 22

Q96. If the length of certain rectangle is decreased by 4 cm and breadth is increased by 2 cm, it would result in a square of the same area. What is the perimeter of the original rectangle?
a) 24 cm b) 20 cm c) 10 cm d) 15 cm

Q97. The radius of a right circular cylinder is five times of its height. If the height of the cylinder is 3.5, then what is the volume of cylinder?
a) 3368.75 cm^3 b) 3872.75 cm^2
c) 3146.75 cm^2 d) 3524.25 cm^3

Q98. The length and breadth of a cuboid is increased by 20% and 25%, respectively, while its height is reduced by 30%. What must be the total percentage increase/decrease in the volume of the cuboid?
a) Increase by 5% b) Increase by 3%
c) Decrease by 2% d) Decrease by 4%

Q99. The hour hand moves through 4 hours and has a length of 6 cm. find the area (in cm^2, rounded off to two decimal places) of the sector covered by the hour hand.
a) 32.69 b) 30.67 c) 37.71 d) 35.75

Q100. Three circles of radius 6 cm are kept touching each other. The string is tightly tied around these three circles. What is the length of the string?
a) 36 + 12p cm b) 36 + 18p cm
c) 24 + 36p cm d) 36 + 20p cm

CGL MAINS 22

Q101. What is the volume of the largest sphere that can be carved out of a wooden cube of sides 21 cm? $\left(\pi = \frac{22}{7}\right)$
a) 3851 cm^3 b) 6858 cm^3 c) 4851 cm^3 d) 5821 cm^3

Q102. The breadth 'b' of a room is twice its height and half of its length. Find the length of the longest diagonal of the room.
a) $\frac{\sqrt{20}b}{2}$ b) $\frac{b}{2}$ c) $\frac{\sqrt{21}b}{2}$ d) $\frac{\sqrt{19}b}{2}$

Q103. If the curved surface area of a cylinder is 126π cm^2 and its height is 14 cm, what is the volume of the cylinder?
a) $283\frac{1}{2}\pi$ cm^3 b) $137\frac{1}{2}\pi$ cm^3
c) $128\frac{1}{2}\pi$ cm^3 d) $125\frac{1}{2}\pi$ cm^3

CHSL PRE 22

Q104. Find the area of a triangle whose length of each side is 13 inches, 15 inches and 14 inches.
a) 84 square inches b) 81.2 square inches
c) 42.1 square inches d) 84.2 square inches

Q105. Circumference of a circle is 88 cm. Chord XY makes an angle of 90 degree at the circumference of this circle. What is the length of XY ?
a) 21 cm b) 28 cm c) 14 cm 4) 42 cm

Q106. Angle subtended by a chord AB on the circumference of a circle is 90 degree. If length of chord AB is 16 cm, then what will be radius of this circle?
a) 10 cm b) 12 cm c) 9 cm 4) 8 cm

Q107. There is a rectangular garden of 240 meters x 80 meters. A path of width 4 metres is build outside the garden along its four sides. What is the area of the path ?
a) 2826 metre^2 b) 2542 metre^2
c) 2916 metre^2 d) 2624 metre^2

Q108. If the square of product of three sides of the triangle is 1024 units and the area of its circumcircle is 16π. What is the area of the given triangle ?
a) 2 sq. units b) 2.5 sq units
c) 3 sq. units d) 4 sq. units

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Q109. A solid cylinder having radius of base as 7 cm and height as 5 cm is bisected from its height to get two identical cylinders. What will be the percentage increase in the total surface area?
a) 58.33 percent b) 64.56 percent
c) 69.44 percent d) 52.56 percent

Q110. The area of a square is 1156 cm^2. What is the respective ratio between the length and the breadth of a rectangle whose length is twice the side of the square and whose breadth is 14 cm less than the side of the square?
a) 17 : 5 b) 16 : 7 c) 21 : 19 d) 19 : 5

ICAR & Selection Phase XI

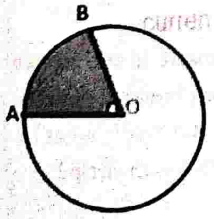
Q111. A spherical ball of diameter 8 cm is cut into two equal parts. The curved area of one such part has to be painted with green colour, while the other part has to be painted with red colour. The bases of both the hemispheres are to be painted with blue colour. The cost of painting with blue is Rs 2/ cm^2, while the cost of painting the curved area is Rs 3/cm^2. What will be the cost (in Rs) of painting the hemispheres? (take π = 3,14)
1. Rs 451.92 2. Rs 803,84
3. Rs 401.92 4. Rs 492.92

CGL PRE 23

Q112. An arc of length 23.1 cm subtends an angle of 18° at the center of a circle. What is the area of that circle? (use π = 22/7)
1. 16878.50 cm^2 2. 16978.50 cm^2 3. 16988.50 cm^2 4. 16798.50 cm^2

Q113. What is the total surface area of a cone of base radius 6 cm and height 8 cm?
1. 301.71 cm^2 2. 350.51 cm^2
3. 364.51 cm^2 4. 354.50 cm^2

Q114. In the following figure, the length of arc AB is equal to five times of the radius r of the circle. Find the area of sector AOB?



1. $2.5r^2$ 2. $\frac{1}{2}r^2$ 3. $3r^2$ 4. $2r^2$

CHSL PRE 23

Q115. If a map of a city was drawn on a scale of 0.2 cm to a km, what area would represent a country if it has an area of 22500 km^2?
1. 5625 km^2 2. 2500 km^2
3. 900 km^2 4. 2250 km^2

Q116. The sum of the radius of the base and the height of a cylinder is 42 m. If the total surface area of the cylinder is 6336 m^2. find the curved surface area of the cylinder correct to two places of decimals (use π = 22/7)
1. 2157.43 m^2 2. 2571.43 m^2
3. 2715.43 m^2 4. 2517.43 m^2

Q117. Find the volume of the largest right circular cone that can be cut out from a cube whose edge is $3\frac{1}{2}$ cm, correct to two places of decimals (use π = 22/7)
1. 21.31 cm^2 2. 12.13 cm^2
3. 11.23 cm^2 4. 13.21 cm^2

Q118. If the curved surface area of a cylinder is increased by 20%, and height is decreased by 4%, then the net decrease or increase in the volume will be:
1. 36% decrease 2. 20% increase
3. 50% increase 4. 33% decrease

Q119. The area of a sector of a circle is 616 cm^2 with a central angle of 10°. The radius of the circle is _____.(use π = 22/7)
1. 28 cm 2. 21 cm 3. 48 cm 4. 84 cm

Q120. If one diagonal of a rhombus is equal to its side, then the diagonals of the rhombus are in the ratio of:
1. √2 : 1
2. √2 : √3
3. √3 : √6
4. 1 : √3

Q121. The perimeter of a sector of a circle of radius 7.4 cm is 20.6 cm. The area of this sector is:
1. 21.46 cm^2 2. 10.73 cm^2
3. 5.8 cm^2 4. 42.92 cm^2

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Selection Phase XII

Q122. A sphere and a cube have equal surface areas. The ratio of the volume of the sphere to that of the cube is: -
a) $\sqrt{3} : \sqrt{\pi}$ b) $\sqrt{2} : \sqrt{\pi}$ c) $\sqrt{2} : \sqrt{\pi}$ d) $\sqrt{6} : \sqrt{\pi}$

Q123. Three solid iron cubes of edges 8 cm, 10 cm and 12 cm are melted together to make a new cube. It is observed that 496 cm3 of the melted material is lost due to improper handling. The area (in cm2) of the whole surface of the newly formed cube is:
1. 1176 2. 3375 3. 1331 4. 2197

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Q124. If the semi-perimeter and area of a rectangular field whose length and breadth are 'x' and 'y' is 12 cm and 28 cm², respectively, then find the value of $x^4 + x^2y^2 + y^4$.
a) 6690 b) 6609 c) 6909 d) 6960

Q125. A cube is having surface area of 5400 square units. Its volume would increase approximately _____ if the side is increased by 5 units.
a) 50% b) 55% c) 59% d) 45%

Q126. If the area of a regular pentagon is 3920 √3 cm², then how long is –
a) 38 cm b) 56 cm c) 46 cm d) 59 cm

CPO 2024

Q127. Two rectangular sheets of paper, each 60 cm × 36 cm, are made into two right circular cylinders, one by rolling the paper along its length and the other along the breadth. The ratio of the volumes of the two cylinders, thus formed, is:
a) 5 : 6 b) 8 : 3 c) 7 : 4 d) 5 : 3

Q128. The length of a side of an equilateral triangle is 18 cm. the area (in cm²) of the region lying between the circumcircle and the incircle of the triangle is (use π = 22/7)
a) $254\frac{3}{7}$ b) $254\frac{1}{7}$ c) $254\frac{2}{7}$ d) $254\frac{4}{7}$

Q129. A hollow sphere of external and internal diameters of 10 cm and 6 cm, respectively, is melted and made into another solid in the shape of a right circular cone of base diameter 10 cm. Find the height of the cone.
a)13.68cm b)14.68cm c)16.68cm d) 15.68 cm

Q130. Three circle each of radius 5 cm touch one another. The area (in cm²) subtended between them is:
a) $50\left(\sqrt{3}-\frac{\pi}{2}\right)$ b) $25\left(\sqrt{3}+\frac{\pi}{2}\right)$
c) $25\left(2\sqrt{3}-\frac{\pi}{2}\right)$ d) $25\left(\sqrt{3}-\frac{\pi}{2}\right)$

Q131. A solid metal cylinder of 12 cm height and 7 cm radius is melted and recast into two cones in the proportion of 1 : 2 (volume), keeping the height 12 cm. What would be the percentage change in the flat surface area before and after (use π = 22/7) ?
a) 35% b) 20% c) 45% d) 50%

CHSL 2024

Q132. The perimeter of a minor sector of a circle of radius 4 units subtending an angle of 45° is:
a) 4 – π units b) 8 - π units
c) 8 + π units d) 4 + π units

Q133. A Cylindrical oil tank has a radius of 5 m and a total surface area of 628 m², what would be its curved surface area ?
a) 401.43 m² b) 371.83 m²
c) 470.8 m² d) 481.43 m²

Q134. What is the area (in square units) of the sector if the radius of the circle is given to be 24 units and the arc length is 7.5 units?
a) 135 b) 180 c) 45 d) 90

Q135. The volume of rectangular block is 12288 m³. Its dimension are in the ratio of 4 : 3: 2. If the entire surface is polished at the rate 2 paise per m², then find the total cost of polishing?
a) Rs 33.28 b) Rs 44.42 c) Rs 66.56 d) Rs 11.14

Q136. A hemispherical bowl is made of silver and has an inner diameter of 4 cm if the thickness of silver is 0.5 cm. Find the volume of silver used in making the bowl correct to two place of decimals (use π = 3.14).
a) 51.96 cm³ b) 15.96 cm³
c) 15.69 cm³ d) 11.69 cm³

Q137. A rectangle with the largest area is cut out of a circle with radius 5 units. What is the area of the remaining portion?
a) 25(2π-3) b) 25(π-2)
c) 25(2π-5) d) 25(π-3)

Q138. A cuboid with dimensions 20cm, 12cm, and 10 cm is cut into 8 identical pieces by 3 cuts. What will be the total surface area of all the pieces?
a) 1680 cm² b) 3360 cm²
c) 2240 cm² d) 1220 cm²

Q139. The volume of a cube is reduced to 72.9%. By how much is the side of the cube reduced?
a) 9.5% b) 10% c) 8.5% d) 9%

Q140. Two equal circles are drawn on a square in such a way that opposite side of the square forms the diameter of each circle. If the remaining area of the square is 42 cm² , what is the measurement (in cm) of the diameter of each circle?
a) 3.5 b) 2.5 c) 14 d) 7

Q141. From a circle, a sector with a central angle of 30° is cut off. If the length of the arc of this sector is 5.5 cm, then find the radius (in cm) of the circle.
(Use π = 22/7)
a) 12 b) 10 c) 10.5 d) 11

Q142. The ratio of the diameters of two spheres is given as 1 : 4. The larger sphere is melted and 125 identical spheres are made out of the molten material. The smaller sphere is

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melted and 27 identical spheres are made out of the molten material. If the ratio of the volume of each of the 125 identical spheres to the volume of each of the 27 identical spheres is given as 1 : m, what is the value of m?

a) $\frac{1728}{125}$ b) $\frac{27}{8000}$ c) $\frac{125}{1728}$ d) $\frac{64}{3375}$

CGL 2024

Q143. A cylindrical tank of radius 14 cm is full of water. If 616 litres of water are drawn out, then the water level in the tank is dropped by _____ m.

$\left(Take\ \pi = \frac{22}{7}\right)$

a) 1000 b) 100 c) 1 d) 10

Q144. What is the central angle of a sector of a circle whose area and perimeter are, respectively, equal to 209 cm² and 63 cm if it is given that its radius is a non-negative integer (roundup to one decimal place)?

a) 55.5° b) 53.5° c) 49.5° d) 51.5°

Q145. One-quarter of a circular pizza of radius 21 cm was removed from the whole pizza. What is the perimeter (in cm) of the remaining pizza ?

(use π = 22/7)

a) 141 b) 128 c) 99 d) 131

Q146. A circular arc whose radius is 24 cm makes an angle of 60° at the centre. The perimeter of the sector formed is :

(Use π = 3.14)

a) 73.22 cm b) 63.12 cm

c) 74.32 cm d) 73.12 cm

46	A	47	A	48	A
49	C	50	A	51	B
52	D	53	C	54	D
55	B	56	A	57	B
58	B	59	C	60	C
61	B	62	D	63	C
64	C	65	D	66	A
67	B	68	D	69	A
70	C	71	B	72	A
73	A	74	B	75	C
76	D	77	D	78	A
79	D	80	B, A,	81	C
82	C	83	A	84	B
85	A	86	B	87	B
88	D	89	A	90	C
91	A	92	D	93	D
94	B	95	A	96	B
97	D	98	A	99	C
100	A	101	C	102	C
103	A	104	A	105	B
106	D	107	D	108	A
109	A	110	A	111	B
112	B	113	A	114	A
115	C	116	C	117	C
118	C	119	D	120	D
121	A	122	D	123	A
124	D	125	C	126	B
127	D	128	D	129	D
130	D	131	D	132	C
133	C	134	D	135	C
136	B	137	B	138	C
139	B	140	C	141	D
142	C	143	D	144	C
145	A	146	D		

ANSWERS

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1	B	2	D	3	C
4	D	5	A	6	B
7	C	8	B	9	C
10	C	11	A	12	B
13	A	14	B	15	D
16	B	17	C	18	C
19	D	20	C	21	B
22	B	23	A	24	C
25	C	26	C	27	A
28	D	29	D	30	A
31	B	32	A	33	C
34	D	35	A	36	B
37	D	38	A	39	B
40	C	41	C	42	C
43	A	44	B	45	C

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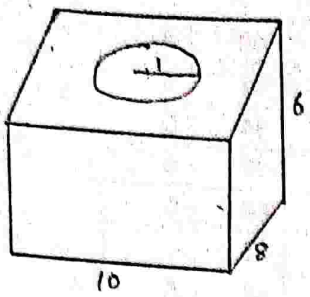
1.



Area of sheet required:
T.S.A of cuboid − Area of circle
$= 2(10\times8 + 8\times6 + 10\times6) - \frac{22}{7}\times1^2$
$= 376 - 3.14$
$= 372.86 \sim 372.9$ approx

2.

	Inner Circle	:	Middle Circle	:	Outer Circle
Ratio of Radius	4	:	5	:	7
Ratio of Area	4^2 ↓ 16	:	5^2 ↓ 25	:	7^2 ↓ 49

$\frac{\text{Two inner circle}}{\text{Two outer circle}} = \frac{25-16}{49-25} = \frac{9}{24}$
$= \frac{3}{8}$ Option D.

3.

Volume of pipe $= \pi h[R^2 - r^2]$
$h = 7.56\text{ m} = 756\text{ cm}$
Volume $= \frac{22}{7}\times756[2.5^2 - 1.5^2]$
$= \frac{22}{7}\times756\times4$
$= 9504\text{ cm}^3$
Weight $= 9504\times7.5\text{ g}$
$= 71280$ grams
In kgs $= \frac{71280}{1000} = 71.28$ kg

4.

Volume $\propto R^3$
Radius : 5 : 3
Volume : 5^3 : 3^3
125 : 27
$\frac{98}{125}\times100 = 78.4\%$.

5.

Area of hexagon:
$\frac{\sqrt{3}}{4}\times(\text{side})^2\times6$
$\frac{\sqrt{3}}{4}\times x^2\times6 = 2400\sqrt{3}$
$x^2 = 1600$
$x = 40$
Cost of fencing = Perimeter × 18.5
$= 6\times40\times18.5$
$= 4440$ Option A.

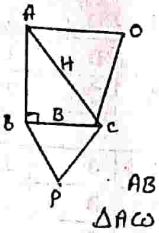
6.

Circumference of circle = Perimeter of Rectangle
$2\times\frac{22}{7}\times\frac{63}{2} = 2(7x+4x)$
$11x = 99$
$x = 9$
Smaller side $= 4x = 4\times9 = 36$

7.

Length of each side $= \frac{12}{3}$ → (no. of sticks) / (no. of sides)
$= 4$ units
Area $= \frac{\sqrt{3}}{4}\times a^2 = \frac{\sqrt{3}}{4}\times4^2$
$= 4\sqrt{3}$ sq units

8.



ABC is an isosceles right angled Δ where hypotenuse is H and base is B
AB = 1 BC = 1 and AC = $\sqrt{2}$
ΔACO ~ ΔBPC [eq Δ]
$\frac{H}{A} = \frac{\text{ar}\,\Delta ACO}{\text{ar}\,\Delta BPC} = \frac{(\sqrt{2})^2}{1^2} = \frac{2}{1} \Rightarrow \frac{A}{H} = \frac{1}{2}$

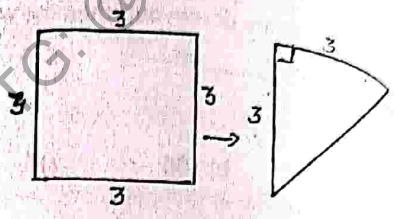
9.

Area of this sector $= \frac{\theta}{360^\circ}\pi r^2$
$A = \frac{60}{360}\pi r^2$
$A = \frac{1}{6}\pi r^2$ — (i)
Also $C = 2\pi r$
$r = \frac{C}{2\pi}$ → Put this in eq^n (i)
$A = \frac{1}{6}\pi\frac{C^2}{4\pi^2}$
$A = \frac{C^2}{24\pi}$

10.

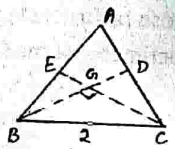
Volume $= \pi R^2 H$
Old Cylinder : New Cylinder
R^2 : 5^2 : 11^2
H : 5 : 125 : 363
238
% Increase $= \frac{238}{125}\times100$
$= 190.4\%$.

11.



After folding the square across its diagonal, it will turn into an isosceles right Δ of equal sides 3 cm.
Hypotenuse will be $\sqrt{3^2+3^2}$
$= 3\sqrt{2}$
Height $= \frac{\text{Perpendicular}\times\text{Base}}{\text{Hypotenuse}}$
$= \frac{3\times3}{3\sqrt{2}} = \frac{3}{\sqrt{2}}$

12.



In ΔABC
CE = medians drawn to equal sides are also equal]
$\frac{2}{3}CE = \frac{2}{3}BD$
Thus BG = GC = x
In right ΔBGC
$2x^2 = 4$
$x^2 = 2$
$x = \sqrt{2}$
Area ΔBGC $= \frac{1}{2}\sqrt{2}\times\sqrt{2}$
$= 1$
or ΔABC = 3 ar ΔBGC = 3×1 = 3

13.

Total surface Area of each box $= 2(30\times25 + 25\times12 + 30\times12)$
$= 2820\text{ cm}^2$
$= 0.2820\text{ m}^2$
No. of boxes $= \frac{11.28}{0.2820} = 40$

14.

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Volume of water
= Area of cross-section × Speed

speed = 5 km/hr = $5 \times \frac{5}{18} = \frac{25}{18}$ m/s

Volume = $\frac{25}{18} \times 3 \times \cancel{36}^{2}$
= 150 in 1 sec

in 1 min or 60 seconds
= 150×60 = 9000

Diameter = 35 cm

Radius = $\frac{7}{40}$ m

Area of cross section × speed × time = Vol

$\frac{22}{7} \times \frac{7}{40} \times \frac{7}{40} \times 8 \times$ time = $\cancel{66}^{3} \times \cancel{35}^{5} \times 3$

time = 45×200 seconds

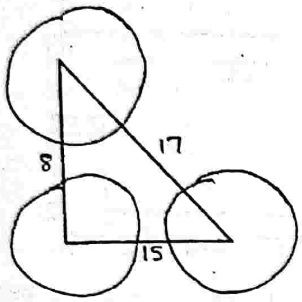
in hours = $\frac{45 \times 200}{} = \frac{10}{} = \boxed{2.5 \text{ hrs}}$

CSA = $\pi r l$
⇒ $3.14 \times 5x \times 13x = 816.4$
$x^2 = 4$
$x = 2$

Height = 12×2 = 24
Radius = 5×2 = 10

Volume = $3.14 \times 100 \times 24 \times \frac{1}{3}$
= 2512

15.

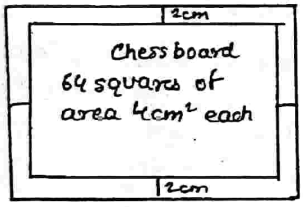


Area of Δ − Area of 3 circles

$\frac{1}{2} \times 15 \times 8 - \frac{180}{360} \times \frac{\cancel{22}^{11}}{\cancel{7}} \times \frac{\cancel{7}}{\cancel{2}} \times \frac{7}{2}$

$= 60 - \frac{77}{4} = 40.75$

16.



Side of inner square
= $\sqrt{\text{area}} = \sqrt{64 \times 4}$
= 16

Length of chessboard
= 16+2+2 = 20

Perimeter = 20×4 = 80

17.

Length	10x	13x
	×	×
Breadth	20	16
	↓	↓
Area:	200x	208x

+30%
−20%

208x − 200x = 100
8x = 100
$x = \frac{100}{8}$

New Area = 208x = $208 \times \frac{100}{8}$
= 2600

18.

19.

Total area to be cemented
2(L+B)×h + L×B
= $2(70) \times \frac{22}{10} + 40 \times 30$
= 1508 m².

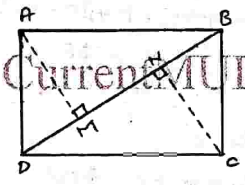
Total cost = 1508×25
= 37700

20.

Height of cone = $\frac{3 \times \text{Volume}}{\text{Area of Base}}$

H = $\frac{3 \times \cancel{924}^{\cancel{84}\ 6}}{\cancel{154}\ \cancel{14}}$
= 6×3 = 18

21.



Now DB = 40, AM = 7.5, NC = 8.6

ar ABCD = ar ΔABD + ar ΔDBC
= $\frac{1}{2}$ DB×AM + $\frac{1}{2}$ DB×NC
= $\frac{1}{2}$ DB (AM+NC)
= $\frac{1}{2} \times 40 \times 16.1$
= 322 cm²

22.

Required Volume = Volume of outer cube − Volume of inner cube.

Dimensions of outer cube = 90×75×50.

Dimensions of inner cube will be 2.5×2 = 5 cm less i.e. 85×70×45

Volume = 90×75×50 − 85×70×45
= 337500 − 267750
= 69750

23.

24.

$\frac{\sqrt{3}}{4} a^2 = 16\sqrt{3}$
a = 8 [length of base]

Now $\frac{1}{2}$ length of base × slant height
= 30 cm²

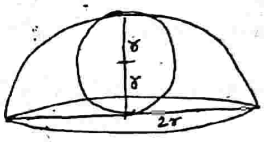
$\frac{1}{2} \times 8 \times$ S.H = 30
S.H = $\frac{15}{2}$

Length of incenter = $\frac{a}{2\sqrt{3}} = \frac{8}{2\sqrt{3}} = \frac{4}{\sqrt{3}}$

(Incenter)² + (Height)² = (Slant height)²
$\frac{16}{3} + (H)^2 = \frac{225}{4}$

$H^2 = \frac{611}{12}$; $H = \sqrt{\frac{611}{12}}$

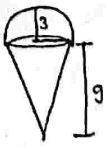
25.



$\frac{\text{Vol. sphere}}{\text{Vol. hemisphere}} = \frac{\frac{4}{3}\pi r^3}{\frac{2}{3}\pi (2r)^3} = \frac{1}{4}$

$\frac{\text{Vol. sphere}}{\text{Vol. remaining solid}} = \frac{1}{4-1} = \frac{1}{3}$

26.



Volume of each toy
= $\frac{2}{3}\pi 3^3 + \frac{1}{3}\pi 3^2 \times 9$
= 45π

Vol. of cylinder = $\pi \times 12^2 \times 15$

N = $\frac{\pi \times 12 \times 12 \times 15}{45\pi} = 48$

27.

T.S.A = S.A of internal and external hemispheres + Area of ring

$\underbrace{2\pi(12.5^2 + 12^2)}_{600.5\pi} + \underbrace{\pi(12.5^2 - 12^2)}_{12.25\pi}$

= 612.75π

28.

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Circumference of base of cone = Length of arc

$C = \frac{120}{360} \times 2 \times \frac{22}{7} \times \frac{21}{2}$

$= 22$

Radius of conical section

$2\pi r = 22$

$r = \frac{7}{2}$

Height $= \sqrt{\left(\frac{21}{2}\right)^2 - \left(\frac{7}{2}\right)^2}$

$= 7\sqrt{2}$

Volume $= \frac{1}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 7\sqrt{2}$

$= \frac{343\sqrt{2}}{12}\pi$

29.

Assume the side of cube be 14cm. The radius of cylinder of max vol. would be 7 and it's height will be 14.

Vol. of cube $= 14^3$ or $7^3 \times 2^3$

Vol. of cylinder $= \frac{22}{7} \times 7^2 \times 14$

$= 44 \times 7^2$

Material left $= 7^2 \times 2^2 \times 3$

% material $= \frac{7^2 \times 2^2 \times 3}{7^3 \times 2^3} \times 100$

$= \frac{3}{14} \times 100$

$= 21.42 \sim 21\%$

30.

R → External Radius

r → Internal Radius

Total Surface Area of a hollow hemispherical vessel is given by $\pi(3R^2 + r^2)$

$= \pi(3 \times 7^2 + 6^2)$

$= \pi(147 + 36)$

$= 183\pi$

31.

15400 Litres $= 15400 \times 1000\ cm^3$

Radius $= \frac{7}{2}\ m = \frac{700}{2}\ cm$

$\frac{22}{7} \times \frac{700}{2} \times \frac{700}{2} \times h = 15400 \times 1000$

$h = 40cm$

32.

Side of cube = a

Dimensions of each cuboid,

$= a \times a \times \frac{a}{3}$

S.A of cube $= 6a^2$

S.A of 1 cuboid $= 2\left(a^2 + \frac{a^2}{3} + \frac{a^2}{3}\right)$

$= 2\left[\frac{5a^2}{3}\right]$

Ratio required $\Rightarrow 6a^2 : 2 \times 2\left[\frac{5a^2}{3}\right]$

$= 9:10$

33.

Revolutions per hour $= 14 \times 60$

$= 840$

Area covered in single revolution = C.S.A of cylinder

$= 2 \times \frac{22}{7} \times \frac{1}{2} \times \frac{5}{4} = \frac{22}{7} \times \frac{5}{4}$

Maximum area $= \frac{22}{7} \times \frac{5}{4} \times 840$

$= 3300$

34.

1% =

0.1% $= \frac{1}{1000} = 10^{-3}$

No. of droplets $= 1.728 \times 10^6 \times 10^{-3}$

$= 1728$

$\frac{4}{3}\pi R^3 = \frac{4}{3}\pi \times 1 \times 1728$

$R^3 = 1728$

$R = 12\ mm$ or $1.2\ cm$

Diameter $= 2.4cm$

35.

L	B	H	
4	2	1	×2
↓	↓	↓	
8	4	2	

$a^3 = 8 \times 4 \times 2$

$a^3 = 64$

$a = 4$

36.

No. of turns $= \frac{\text{Length of wire}}{\text{Circumference}}$

$= \frac{L}{C}$ - Option 3

37.

To get eight identical cuboids, cuts have to be made at the mid-points of length, breadth and height

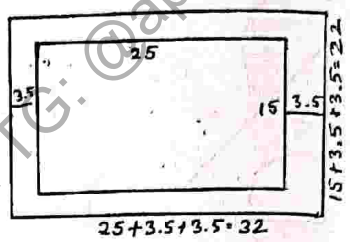
Thus new dimensions of each identical cuboid will be

$\frac{100}{2}$ $\frac{80}{2}$ $\frac{60}{2}$ i.e. 50, 40, 30

T.S.A $= 2(50 \times 40 + 40 \times 30 + 50 \times 30)$

$= 7500$

38.



Area of Park $= 32 \times 22 - 25 \times 15$

$= 704 - 375$

$= 329$

Total Cost $= 329 \times 25.5$

$= 8389.5$

39.

10mm = 1cm

Volume of cube $= 2(a)^3$

$= 2 \times 1^3 = 2cm^3$

$1cm^3 = 1ml$

$2cm^3 = 2ml$.

Total volume

$= 200 + 2$

$= 202\ ml.$

40.

Face diagonal = $\sqrt{2}$ × side

$128\sqrt{2} = \sqrt{2} \times$ side

side $= 128$

Volume $= (128)^3$

Now $512 \times 160 \times H = (128)^3$

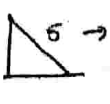
$H = 25.6$

41.

$\frac{\text{Vol. Cone}}{\text{Vol. Cylinder}} = \frac{\frac{1}{3}\pi \times 3^2 \times h}{\pi \times 6^2 \times 1} = \frac{1}{3}$

$= \frac{3h}{36} = \frac{1}{3}$

$h = 4$



→ (3,4,5) triplets

Slant height = 5

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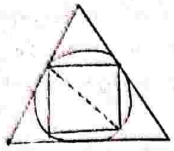
42.



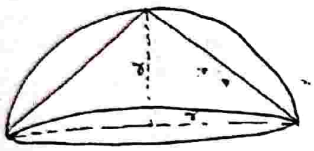
Inradius of eq $\Delta = \frac{a}{2\sqrt{3}} = \frac{24}{2\sqrt{3}} \cdot \frac{12}{\sqrt{3}}$

Diameter of circle = Diagonal of square

$2 \times \frac{12}{\sqrt{3}}$ = Diagonal $= \frac{24}{\sqrt{3}}$

Area of square $= \frac{D^2}{2} = \frac{24^2}{3 \times 2} = 96$

43.



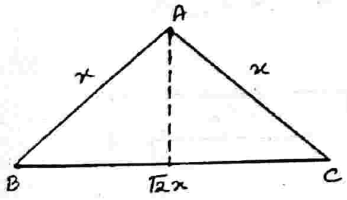
$\frac{\text{Vol. of hemisphere}}{\text{Vol. of cone}} = \frac{\frac{2}{3}\pi r^3}{\frac{1}{3}\pi r^2 \times r} = \frac{2}{1}$

Remaining solid = Vol. hemisphere − Vol. of cone

$= 2 - 1 = 1$

% material remaining $= \frac{1}{2} = 50\%$.

44.



ΔABC is an isosceles right Δ

Right angled at A.

Now $\sqrt{2}x(\sqrt{2}+1) = 16(\sqrt{2}+1)$

$x = 8\sqrt{2}$

area $= \frac{1}{2} \times 8\sqrt{2} \times 8\sqrt{2} = 64\ cm^2$

45.

60 litr in 1 minute

3600 litr in 60 min

1 ltr $= \frac{1}{1000}\ m^3$

3600 ltr $= \frac{3600}{1000} = 3.6\ m^3$

Time taken $= \frac{72}{3.6} = 20$ hrs

46.

$\frac{2\pi rh}{2\pi r(h+r)} = \frac{2}{5}$

$\frac{h}{h+r} = \frac{2}{5}$

$h = 2x \quad r = 3x$

Now $2 \times \frac{22}{7} \times 3x(5x) = 1155$

$x^2 = \frac{49}{4}$

$x = \frac{7}{2}$

Height $= 2x = 2 \times \frac{7}{2} = 7$

47.

Diagonal of cube will be equal to diameter of sphere.

If side of cube is a, then its diagonal will be $\sqrt{3}a$

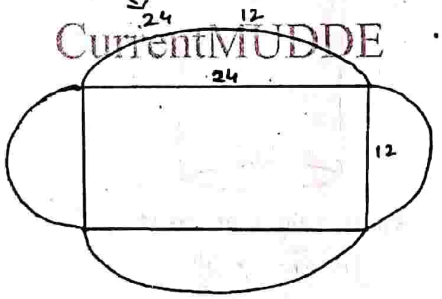
Now $\sqrt{3}a = 6 \times 2$

$a = 4\sqrt{3}$

48.

Length : Breadth

$x : 12 \times 12$



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Total area to be levelled

$= 24 \times 12 + \pi(12^2 + 6^2)$

$= 288 + 565.2$

$= 853.2$

Total cost $= 853.2 \times 100$

$= 85320$

49.

$3.96\ dm^3 = 3.96 \times 10^3\ cm^3$

$= 3960\ cm^3$

$\frac{22}{7} \times \frac{3}{10} \times \frac{3}{10} \times h = 3960$

$h = 14000\ cm$ or $140\ m$

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50.

Dimensions of triangular ground (400, 420, 580) which is multiple of pythn triplet (20, 21, 29)

$73\frac{1}{3}\% = \frac{220}{300}$

$\frac{220}{300} \times \frac{1}{2} \times 400 \times 420 = \frac{22}{7} \times r^2$

$r = 140\ m$

Circumference $= 2 \times \frac{22}{7} \times 140$

$= 880\ m$

51.

$\frac{1}{3}\pi x^2 \times x = 72\pi$

$x = 6$

Slant height $= \sqrt{2} \times 6^2$

$= 6\sqrt{2}$

C.S.A $= \pi \times 6 \times 6\sqrt{2}$

$= 36\sqrt{2}\pi$

52.

$\frac{22}{7} \times r^2 = 3118.5$

$r^2 = 992.25$

$r = 31.5$

Circumference $= 2 \times \frac{22}{7} \times 31.5$

$= 198$

Rectangle's perimeter $= 2(7x + 4x)$

$2(11x) = 198$

$x = 9$

Length $= 7x = 7 \times 9 = 63$

53.

$\frac{\text{CSA}}{\text{Area of Base}} = \frac{\pi r l}{\pi r^2} = \frac{l}{r} = \frac{4}{1}$

Height $= \sqrt{(4x)^2 - x^2} = \sqrt{15}x$

$\sqrt{15}x = 35$

$x = \frac{35}{\sqrt{15}} =$ Radius

Volume $= \frac{22}{7} \times \frac{35 \times 35}{15} \times 35 \times \frac{1}{3}$

$= 2994.44\ cm^3$

$= 2.994$

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54.

= Total height of the stack

$= 60 \times \frac{1}{3} = 20$ cm

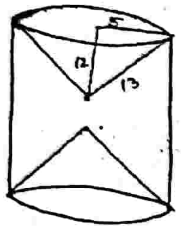
Radius $= \frac{21}{2}$ cm

Volume $= \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} \times 20$

$= 6930\ cm^3$

in $m^3 = \frac{6930}{(100)^3} = 6.93 \times 10^{-3}$

55.



Slant height of cone $= \sqrt{5^2+12^2}$

$= 13$

T.S.A of remaining solid

= C.S.A of cylinder + C.S.A of 2 identical conical sections

$= 2\pi \times 5 \times 30 + 2\pi \times 5 \times 13$

$= 300\pi + 130\pi$

$= 430\pi$

56.

Volume $= \frac{\text{Weight}}{\text{Density}} = \frac{6688}{10.5}$

$\frac{4}{3} \times \frac{22}{7} (216 - r^3) = \frac{6688}{21} \times 2$

$216 - r^3 = 152$

$r^3 = 64$

$r = 4$

Thickness $= 6 - 4 = 2$ cm

57.

$4 \times \frac{22}{7} \times (R+r) \times 2.5 = 110$

$R + r = 8.5$

$R - r = 2.5$

$r = \frac{3.5 - 2.5}{2} = \frac{1}{2}$

Volume $= \frac{4}{3} \times \frac{22}{7} \times \frac{1}{8}$

$= \frac{11}{21}$

58.

Volume to be emptied

$= \frac{2}{3}$rd of volume of hemisphere

$= \frac{2}{3} \times \frac{2}{3} \times \frac{22}{7} \times (10.5)^3$

$= 1617\ m^3$

$1\ m^3 = 1000\ L$

$1617\ m^3 = 1617 \times 1000\ L$

Time taken $= \frac{\text{Total Vol. (In L)}}{\text{Speed}}$

$= \frac{1617 \times 1000}{7.7}$

$= 210{,}000$ sec

In hours $= \frac{210{,}000}{3600} = \frac{175}{3}$ hrs

59.

$8x^3 = 18 \times 36 \times 72$

$x = 18$

$\frac{\text{T.S.A cuboid}}{\text{T.S.A cubes}} = \frac{2(18\times36 + 36\times72 + 18\times72)}{2(18+18)\times18\times8}$

$= 7.8$

60.

Slant height of cone

$= \sqrt{18^2 + 7.5^2} = \frac{39}{2}$

Total Surface Area

= C.S.A of cylinder + C.S.A of cone + Area of base of cylinder

$= \pi(7.5)^2 + \pi \times 7.5 \times \frac{39}{2} + 2\pi \times 7.5 \times 18$

$\pi \times 7.5 \left(7.5 + \frac{39}{2} + 2 \times 18\right)$

$= \pi \times 7.5 \times (63)$

$= 472.5\pi$

61.

Assume the side of cube be 14cm. The radius of cylinder of maximum volume would be 7cm. and it's height will be 14cm.

Volume of cube $= 14^3$ or $7^3 \times 2^3$

Volume of cylinder $= \frac{22}{7} \times 7^2 \times 14$

$= 44 \times 7^2$

Material Left $= 7^2 \times 2^2 \times 3$

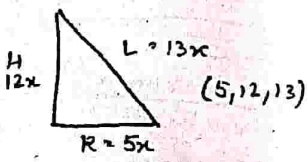
% material left $= \frac{7^2 \times 2^2 \times 3}{7^3 \times 2^3} \times 100$

$= \frac{3}{14} \times 100$

$= 21.42 \sim 21.5\%$

62.

$\frac{R}{H} = \frac{1}{2.4} = \frac{10}{24} = \frac{5}{12}$



$\frac{22}{7} \times 5x \times 13x = 2502.5$

$x^2 = 12.25$

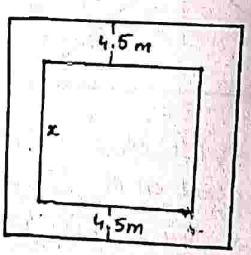
$x = 3.5$

Volume $= \frac{1}{3} \times \frac{22}{7} \times 5^2 \times 12 \times (3.5)^3$

$= 1347.5\ cm^3$

63. $8^3 = 16 * 8 * h \Rightarrow h = 4$.

64.



Side of smaller square = x

" " larger square = (x+9)

Now $(x+9)^2 - x^2 = 105.75$

$(x+9+x)(x+9-x) = 105.75$

$(2x+9) = 11.75$ or $11\frac{3}{4} = \frac{47}{4}$

$2x = \frac{47}{4} - 9$

$x = \frac{11}{8}$ m

Perimeter $= \frac{11}{8} \times 4 = \frac{11}{2}$ m

Total cost $= \frac{11}{2} \times 100 = 550$

65.

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Direct: If 'd' is the diagonal of a square, then its area will be $\frac{d^2}{2}$

Here $d = (a+b)$

$d^2 = a^2+b^2+2ab$

$\frac{d^2}{2} = \frac{1}{2}(a^2+b^2)+ab$

66.

$\frac{4}{3}\pi \times 12^3 = \pi \times 16^2 \times h$

$h = 9$ cm

67.

$Y = 14x$

$\frac{Y}{x} = 14 = \frac{\text{Volume}}{\text{Surface Area}}$

$\frac{\frac{4}{3}\pi R^3}{4\pi R^2} = 14$

$\frac{R}{3} = 14$

$R = 42$

68.

Area of base $= \pi r^2 = 38.5 = \frac{77}{2}$

$r = \frac{7}{2}$

$2 \times \frac{22}{7} \times \frac{7}{2} \times h = 616$

$h = 28$

Volume = Area of base × Height

$= 38.5 \times 28$

$= 1078$

69.

Base × Height = Area

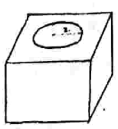
$\frac{7}{5} \times x = \frac{8}{5}$

$x = \frac{8}{7}$

Increase of 1 on 7

i.e. $\frac{1}{7} = 14.29\%$.

70.



Total surface Area of the remaining solid will be Surface area of 6 hemispherical depressions + Surface area of 6 surfaces of this type.

Surface Area of 6 hemispherical depressions $= 6 \times 2 \times \frac{22}{7} \times 2^2$

$= 48\pi$

Area of 6 faces

$= [10)^2 - \pi(2)^2]$

$= 6 \times [100 - 4\pi]$

$= 600 - 24\pi$

Total area $= 600 - 24\pi + 48\pi$

$= 600 + 24\pi$

$= 600 + 24 \times \frac{22}{7}$

$= 600 + 24\left[3 + \frac{1}{7}\right]$

$= 600 + 72 + \frac{24}{7}$

$= 600 + 72 + 3\frac{3}{7}$

$= 675\frac{3}{7}$

71.

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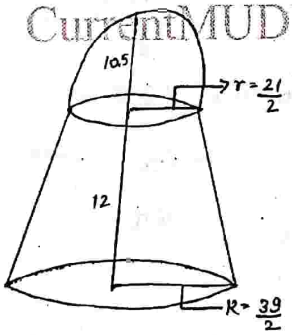

Slant height of frustum

$= \sqrt{H^2 + (R-r)^2}$

$= \sqrt{12^2 + \left(\frac{39}{2} - \frac{21}{2}\right)^2}$

$= \sqrt{12^2 + 9^2} = 15$

C.S.A of frustum $= \pi(R+r)L$

$= \pi \times 30 \times 15$

$= 450\pi$

C.S.A of sphere $= 2\pi\left(\frac{21}{2}\right)^2$

$= 220.5\pi$

Total area of tent $= 450\pi + 220.5\pi$

$= 210\frac{7}{7}$

Bruce Wayne

72.

Total volume melted

$= \frac{1}{3}\pi \times 7^2 \times 7 + 2 \times \frac{4}{3}\pi 7^3$

$= \frac{343}{3}\pi + \frac{2744}{3}\pi$

$= \frac{3087}{3}\pi$

Volume of cylinder

$= \pi \times 7^2 \times H = \frac{3087}{3}\pi$

$H = 21$

C.S.A of cylinder

$= 2 \times \frac{22}{7} \times 7 \times 21$

$= 924$

73.

Volume of cylindrical shell

$= \pi(R^2 - r^2) \times h$

Here R = outer radius = b (given)

r = inner radius = (R − thickness)

$r = (b-a)$

$\pi[b^2 - (b-a)^2] \times h = \frac{4}{3}\pi r^3$

$(b+b-a)(b-b+a) \times h = \frac{4}{3}r^3$

$h \times a(2b-a) = \frac{4}{3}r^3$

$h = \frac{4r^3}{3a(2b-a)}$

74.

Volume $\propto r^2 h$

Here $r = h$

r^2	5^2	:	8^2
h	5	:	8
	125	:	512

Now $\frac{64}{125} \times 512$

$= 262.144$

75.

With thickness 1 cm, each of the dimensions viz. length breadth and height will increase by $(2 \times 1) = 2$ cm.

$L = 30+2 = 32$ $B = 18+2 = 20$

& $H = 23+2 = 25$

Volume $= 32 \times 20 \times 25$

$= 16000$ cm^3

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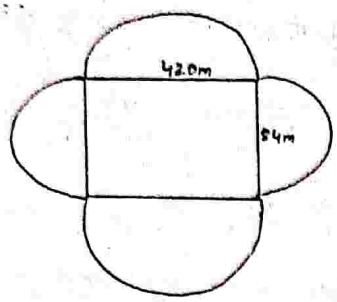
76.



Total area = $(L \times B) + \pi\left(\frac{L^2}{2} + \frac{B^2}{2}\right)$

$= 420 \times 84 + \pi(210^2 + 42^2)$

$= 35280 + \pi(45864)$

$= 35280 + 144144 = 179426\ m^2$

in hectares = $\frac{179426}{(100)^2}$

= 17.9 hectares

77.

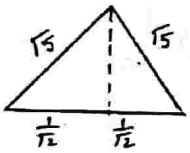
Put a = b = 1. The sides of the triangle will be

$\sqrt{a^2+b^2} = \sqrt{2}$

$\sqrt{(2a)^2+b} = \sqrt{5}$

$\sqrt{a+(2b)^2} = \sqrt{5}$

This will be an isosceles △



Height = $\sqrt{(\sqrt{5})^2 - \left(\frac{1}{\sqrt{2}}\right)^2}$

$= \frac{3}{\sqrt{2}}$

Area = $\frac{3}{\sqrt{2}} \times \frac{1}{\sqrt{2}} = \frac{3}{2} = \frac{3}{2}ab$

78.

$(\text{Slant Edge})^2 = \left(\frac{\text{Diagonal}}{2}\right)^2 + (\text{Height})^2$

Diagonal = $\sqrt{2} \times$ side = $\sqrt{2} \times 8\sqrt{2} = 16$

$\frac{D}{2} = \frac{16}{2} = 8$

Now

$(10)^2 = (8)^2 + H^2$

$H = 6$

Volume = $\frac{1}{3} \times$ Area of Base $\times$ Height.

$= \frac{1}{3} \times (8\sqrt{2})^2 \times 6$

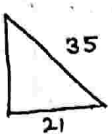
$= 128 \times 2 = 256$

79.

$\pi \times r \times l = 2310$

$\frac{22}{7} \times 21 \times l = 2310$

$l = 35$



$H = \sqrt{l^2 - r^2}$

$= 28$

New radius = $21 \times 2 = 42$

New height = $\frac{28}{2} = 14$

Volume = $\frac{1}{3} \times \frac{22}{7} \times (42)^2 \times 14$

$= 25,872\ cm^3$

In litres = $\frac{25872}{1000} = 25.9$ apx

80.

Volume of prism = Area of Base $\times$ Height

$648 = \frac{1}{2} \times 9 \times 12 \times H$

$H = 12\ cm$

80.

Section of circle = $\frac{\text{Area of sector}}{\text{Area of circle}}$

$= \frac{54\pi}{\pi \times 18^2}$

$= \frac{1}{6}$

Length of arc = $\frac{1}{6} \times 2\pi r$

$= \frac{1}{6} \times 2 \times \pi \times 18$

$= 6\pi$

81.

Bricks required = $\frac{\text{Vol. of wall}}{\text{Vol. of each brick}}$

$= \frac{12 \times 9 \times \frac{9}{10} \times \frac{17}{18}}{\frac{1}{10} \times \frac{75}{100} \times \frac{7}{100}}$ → $\frac{17}{18}$ has been taken coz $\frac{1}{18}$ of the wall will be filled

$= 174857.14$ bricks

No. of packs required

$= \frac{174857.14}{450}$

$= 388.57 \sim 389$

82.

Volume of liquid = Volume of cuboid − Volume of 24 spheres

Vol. cuboid = $12 \times 4 \times 4$

$= 192$

Vol. 24 spheres = $24 \times \frac{4}{3} \times \frac{22}{7} \times (1)^3$

$= 100.57$

$192 - 100.57$

$= 91.43 \sim 91.4$

83.

Radius of cylinder = Radius of sphere

Radius = $\frac{28}{2} = 14$ cm

Height of cylinder = Diameter of sphere

Height = 28

Vol. = $\frac{22}{7} \times 14^2 \times 28$

$= 17248\ cm^3$

84.

Volume of frustum of cone = $\pi(R^2 + r^2 + Rr) \times h$

$= \frac{22}{7} \times (35^2 + 21^2 + 35 \times 21) \times \frac{50}{3}$

$= 125767$

85.

Perimeter of sector = $2r + \frac{\theta}{360} \times 2\pi r$

$2 \times 8.2 + \frac{\theta}{360} \times 2\pi \times 8.2 = 22.4$

$\frac{\theta}{360} = \frac{6}{2 \times \pi \times 8.2}$

Area = $\frac{\theta}{360} \pi r^2$

$= \frac{6}{2 \times \pi \times 8.2} \times 8.2 \times 8.2 \times \pi$

$= 24.6\ cm^2$

86.

Volume of pit = [Area of field − Area of pit] $\times$ Height

$18 \times 15 \times 6 = [90 \times 75 - 18 \times 15] \times H$

$1620 = 6480 \times H$

$H = 0.25m$

$= 25\ cm$

87.

Perimeter of sector = $2r + \frac{\theta}{360} 2\pi r$

$= 2 \times 12 + \frac{75}{360} \times 2\pi \times 12$

$= 24 + 5\pi$

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88.

Length of arc $AB = \frac{\theta}{360} \times 2\pi r$

Now $\frac{\theta}{360} \times 2\pi r = 2r$ [given].

Area of sector $= \frac{\theta}{360} \times \pi r^2$

$= \frac{1}{\pi} \times \pi r^2$

$= r^2$

89.

For each cone

(Slant height)^2 = (Radius)^2 + (Height)^2

$(S.h) = \sqrt{8^2+6^2}$

$= 10$

C.S.A of all cones

$= 3 \times \pi r l$

$= 3 \times \pi \times 6 \times 10$

$= 180\pi$

90.

Volume $\propto R^2 \times H$

R^2	5^2	3^2
H	1	5
	25 :	45

$\boxed{5 : 9}$

91.

$\frac{\text{Area of sector}}{\text{Length of Arc}} = \frac{\theta/360 \times \pi r^2}{\theta/360 \times 2\pi r} = \frac{128}{64}$

$= \frac{r}{2} = 2$

$r = 4$ cm

92.

L	B	H
5x	x	8

Area of 4 walls $= 2(L+B) \times H$

$2(6x) \times 8 = 720$

$x = 7.5$

$L = 37.5$

$B = 7.5$

T.S.A $= 2(37.5 \times 7.5 + 7.5 \times 8 + 37.5 \times 8)$

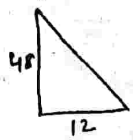
$= 2(641.25)$

$= 1282.5$

93.

$\frac{4}{3}\pi(10^3+8^3+6^3) = \frac{1}{3} \times \frac{22}{7} \times 12^2 \times h$

$h = 48$



$L = \sqrt{48^2+12^2}$

$= 12\sqrt{17}$

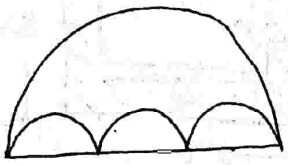
Volume $= \pi \times r \times l$

$= 3.14 \times 12 \times 12\sqrt{17}$

$= 1864.303$

$= 1864.41$ apx

94.



Assume radius of smaller semicircle be r.

Radius of bigger semicircle will be $\frac{2r \times 3}{2} = 3r$

Area of bigger semicircle / Area of 3 smaller semi-circles

$= \frac{1}{2}\pi(3r)^2 / 3 \times \frac{1}{2} \times \pi \times r^2 = \frac{3}{1}$

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Ratio of $\frac{\text{Red}}{\text{Blue}} = \frac{1}{3-1} = \frac{1}{2}$

95.

For each cone

(Slant height)^2 = (Radius)^2 + (Height)^2

$S.h = \sqrt{8^2+6^2}$

$= \sqrt{100} = 10$

C.S.A of all 3 cones

$= \pi \times r \times l \times 3$

$= 3 \times \pi \times 6 \times 10$

$= 180\pi$

96.

If (L-4) and (B+2) results in a square of equal area.

It means $L-4 = B+2$

$L - B = 6$

Assume $B = x$

$L = (x+6)$

As per question

$x(x+6) = (x+6-4)(x+2)$

$x^2+6x = (x+2)^2$

$x^2+6x = x^2+4x+4$

$x = 2$

$L = 8$; $B = 2$ $P = 2(8+2) = 20$

Bruce Wayne

97.

$\frac{R}{H} = \frac{5}{1}$

Volume $= \frac{22}{7} \times 5^2 \times 1 \times (3.5)^2$

$= \frac{22}{7} \times 25 \times 3.5 \times 3.5^2$

$= 3368.75\ cm^3$

B and C are not possible b'coz volume is always in cubic m or cm.

Between A & D only A is possible as only A is divisible by 11.

98.

Volume $\propto L \times B \times H$

L	5 :	6
B	4 :	5
H	10 :	7
	40	42
	+2	

% ↑ $= \frac{2}{40} \times 100 = 5\%$ inc

99.

Hour hand covers 360° in 12 hours. So angle covered in 4 hours

$\frac{360°}{12} \times 4 = 120°$.

Area $= \frac{\theta}{360} \times \pi r^2$

$= \frac{120}{360} \times \pi \times 36$

$= 12 \times 3.14$

$= 37.68 \sim 37.71$

100.

Length of string

$= (2\pi r + nd)$

where

n: no. of circles

d: diameter and r: radius

So: $2\pi \times 6 + n \times 2 \times 6$

$= 12\pi + 36$

101.

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$D = 21$

$r = \frac{21}{2}$

$\frac{4}{3} \times \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} \times \frac{21}{2}$

$= 4851\ cm^3$

102.

l	b	h
$2b$	b	$\frac{b}{2}$

$= \sqrt{l^2 + b^2 + h^2}$

$= \sqrt{4b^2 + b^2 + \frac{b^2}{4}}$

$= \frac{\sqrt{21}\, b}{2}$

103.

$2\pi rh = 126\pi$

$r = \frac{126\pi}{2\pi \times 14}$

$r = 4.5$

$\pi r^2 h$

$= \pi \times \frac{45}{10} \times \frac{45}{10} \times 14$

$= 283\frac{1}{2}\pi\ cm^3$

104.

Area $= \sqrt{s(s-a)(s-b)(s-c)}$

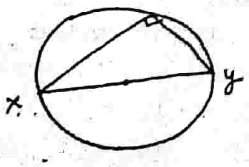
$= \sqrt{21 \times 8 \times 6 \times 7}$

$\sqrt{7 \times 3 \times 4 \times 2 \times 2 \times 3 \times 7}$

$= 7 \times 3 \times 4$

Area $= 84\ inch^2$ (Ans)

105.



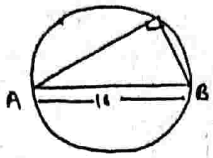
xy = must be diameter

$2\pi r = 88$

$r = 14$

xy (diameter) $= 28$ cm (Ans)

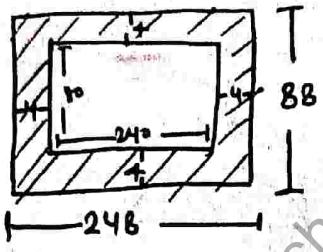
106.



AB must be diameter.

So, Radius = 8cm.

107.



New Side $= 240+8\ ,\ 80+8$

$= 248\ m\ ,\ 88m$

Area of Path $= 248 \times 88 - 240 \times 80$

$= 2824$ meter^2 (Ans)

108.

$a \times b \times c = \sqrt{1024}$

$= 32$

$\pi R^2 = 16\pi$

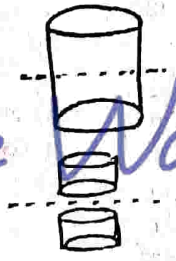
$R = 4$

$R = \frac{abc}{4\Delta}$

$4 = \frac{32}{4\Delta}$

$\Delta = 2$

109.



Inc. in total surface area = two new faces generated

$\Rightarrow 2\pi r^2$

Increase% $\Rightarrow \frac{2\pi r^2}{2\pi rh + 2\pi r^2} \times 100$

$\Rightarrow \frac{r}{h+r} \times 100$

$\Rightarrow \frac{7}{12} \times 100 = 58\frac{1}{3}$

110.

ar. of square $= 1156\ cm^2$

side $= 34$ cm

Length $= 34 \times 2$

$\Rightarrow 68$

Breadth $\Rightarrow 34 - 14 = 20$

Ratio $\Rightarrow 68 : 20$

$\Rightarrow 17 : 5$

111.

$4\pi r^2 \times 3 + 2\pi r^2 \times 2$

$= 16\pi r^2$

$= 16 \times 4^2 \times 3.14$

$= 803.84$

112.

$l = \frac{\pi r \theta}{180}$

$23.1 = \frac{22}{7} \times \frac{r \times 18}{180}$

$r = \frac{21 \times 7}{2}$

$\pi r^2 = \frac{22}{7} \times \frac{21 \times 7}{2} \times \frac{21 \times 7}{2}$

$= 16978.5\ cm^2$

113.

$l = \sqrt{6^2 + 8^2} = 10$

$T.S.A = \pi r(l + r)$

$= \frac{22}{7} \times 6 \times 16$

$= 301.71$

114.

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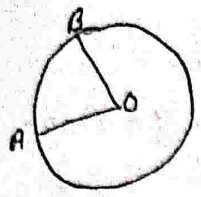


$AB = 5r$

$AB = \frac{\pi r\theta}{180} = 5r$

$\theta = \frac{180 \times 5}{r\pi}$

$AOB = \frac{\pi \times r^2 \times 180 \times 5}{\times 360 \times \pi}$

$= 2.5r^2$

115.

1 km ⟶ 0.2 cm

1 km² ⟶ 0.2 × 0.2

22500 km² ⟶ 900 km²

116.

$r + h = 42$

$2\pi r(h + r) = 6336$

$2 \times \frac{22}{7} r = \frac{6336}{42}$

$r = 24$

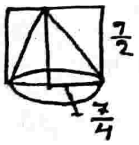
$h = 18$

क्षेत्र $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 24 \times 18$

$= 2715.43\ m^2$

117.



आयतन $= \frac{1}{6}\pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times \frac{7}{4} \times \frac{7}{4} \times \frac{7}{2}$

$= \frac{539}{48} = 11.23\ cm^2$

118.

$\frac{2\pi r_1 \times 100}{2\pi r_2 \times 96} = \frac{5}{6}$) +20%

$\frac{r_1}{r_2} = \frac{4}{6}$) +25%

आयतन $= \pi r^2 h$

$= \frac{4 \times 4 \times 100}{5 \times 5 \times 96} = \frac{2}{3}$) +50%

119.

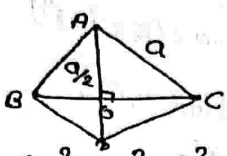
$\frac{\pi r^2 \theta}{360} = 616$

$\frac{22}{7} \times r^2 \times \frac{10}{360} = 616$

$r^2 = \frac{616 \times 36 \times 7}{22}$

$r = 84.$

120.



$OC^2 = a^2 - \frac{a^2}{4}$

$BC = 2 \times OC$

$= 2 \times \frac{\sqrt{3}}{2} a$

$= \sqrt{3}a$

$AD = a$

$\frac{AD}{BC} = \frac{1}{\sqrt{3}}$

121.

परिमाप $= 2r + l$

$20.6 = 14.8 + l$

$l = 5.8$

त्रिज्यखंड का क्षेत्र $= \frac{l}{2\pi r} \times \pi r^2$

$= \frac{5.8}{2} \times 7.4$

$= 21.46$

122.

$4\pi r^2 = 6a^2$

$r^2 = \frac{3a^2}{2\pi}$

$r = a\sqrt{3/2\pi}$

$\frac{\text{Vol sphere}}{\text{Cube}} = \frac{\frac{4}{3}\pi r^3}{a^3}$

$= \frac{4}{3}\pi \times \frac{a^3 \times 3\sqrt{3}}{2\pi\sqrt{2\pi}}$

$= \sqrt{6} : \sqrt{\pi}$

123.

$8^3 + 10^3 + 12^3 = 3240$

Rem $3240 - 496 = 2744$

$a^3 = 2744$

$a = 14$

$6a^2 = 1176$

124.

$x + y = 12$

$xy = 28$

$x^2 + y^2 = 144 - 56 = 88$

$x^4 + y^4 + 2x^2y^2 - x^2y^2$

$(x^2 + y^2)^2 - (xy)^2$

$88^2 - 28^2$

$116 \times 60 = 6960$

125.

$6a^2 = 5400$

$a_1 = 30$

$a_2 = 35$) +16.66%

Vol inc by $= \frac{7}{6} \times \frac{7}{6} \times \frac{7}{6}$

$= \frac{343}{216}$] +127

$\frac{127}{216} \times 100 = 58.79\%$

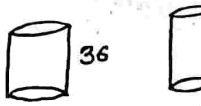
126.

$5 \times \frac{\sqrt{3}}{4} \times a^2 = 3920\sqrt{3}$

$a^2 = 3136$

$a = 56$

127.



$2\pi r = 60$ $\quad r = \frac{30}{\pi}$

$2\pi r = 36$ $\quad r = \frac{18}{\pi}$

$\frac{V_1}{V_2} = \frac{\pi \times \frac{900}{\pi^2} \times 36}{\pi \times \frac{324}{\pi^2} \times 60}$

$= \frac{5}{3}$

128.

$R = \frac{a}{\sqrt{3}} = 6\sqrt{3}$

$r = \frac{a}{2\sqrt{3}} = 3\sqrt{3}$

Area $= \pi\{(6\sqrt{3})^2 - (3\sqrt{3})^2\}$

$= \frac{22}{7} \times 81 = 254\frac{4}{7}$

129.

$\frac{4}{3}\pi(5^3 - 3^3) = \frac{1}{3}\pi \times 25 \times h$

$h = \frac{4 \times 98}{24} = 15.7$

130.

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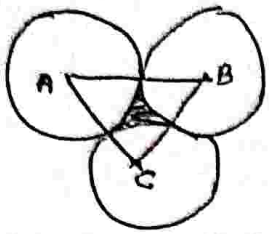


Area $\triangle ABC$ − 3 × Area of Sector

$\frac{\sqrt{3}}{4} \times 100 - 3\pi \times 25 \times \frac{60}{360}$

$25\left(\sqrt{3} - \frac{\pi}{6}\right)$

131.

$\pi R^2 h = \frac{1}{3}\pi r_1^2 h : \frac{1}{3}\pi r_2^2 h$

$3R^2 = r_1^2 : r_2^2$

$3 : 1 : 2$

3 unit — 3×49

1 " — 49

$r_1 = 7$

$r_2 = 7\sqrt{2}$

Cylinder $= 2\pi r^2$

$= 98\pi$

2 cone $= \pi r_1^2 + \pi r_2^2$

$= 49\pi + 98\pi = 147\pi$

$98\pi : 147\pi$

$+ 50\%$

132.

$\frac{2\pi r}{360} \times 45 = \frac{2 \times \pi \times 4}{360} \times 4r$

$= \pi$

$2r + \pi = 8 + \pi$

133.

$2\pi r^2 = 2 \times 3.14 \times 25$

$= 157$

C.S.A = Total S.A − $2\pi r^2$

$= 628 - 157$

$= 471.$

134.

Arc $= \frac{2\pi r\theta}{360} = 7.5$

$\theta = \frac{7.5 \times 36}{2\pi r}$

Area $= \frac{\pi r^2 \theta}{360} = 90'$

135.

$4x \times 3x \times 2x = 12288$

$x^3 = 512$

$x = 8$

$L = 32, b = 24, h = 16$

T.S.A $= 2(lb + bh + hl)$

$= 2(768 + 384 + 512)$

$= 3328$

Cost $= \frac{3328 \times 2}{100}$

$= 66.56$

136.

Vol $= \frac{2}{3} \times 3.14 \times ((2.5)^3 - 2^3)$

$= \frac{2}{3} \times 3.14 \times 7.625$

$= 15.7 + \ldots\ldots$

~ 15.96

137.

Diameter of circle = Diagonal of S2

$10 = \sqrt{2}a$

$a = 5\sqrt{2}$

area $= 50$

Rem area $= 25\pi - 50$

$= 25(\pi - 2)$

138.

$2 \times 12 \times 10 - 10 \times 6 \times 5$

T.S.A $= 2 \times 8(10 \times 6 + 6 \times 5 + 5 \times 10)$

$= 2240$

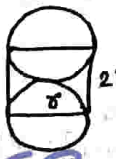
139.

$\sqrt[3]{1000} : \sqrt[3]{729}$

$10 : 9$

$\frac{1}{10} \times 100 = 10\%$

140.



$(2r)^2 - \pi r^2 = 42$

$r = 7$

$D = 14.$

141.

$30' \text{ —— } 55$

$360 \text{ —— } 66$ — Perimeter

$2 \times \frac{22}{7} \times r = 66$

$r = 10.5$

142.

$r = x, 4x$

$\frac{4}{3}\pi x^3 = \frac{4}{3}\pi a^3 \times 27$

$\frac{x}{a} = \frac{3}{1} \Rightarrow a = \frac{x}{3}$

$\frac{4}{3}\pi (4x)^3 = \frac{4}{3}\pi b^3 \times 125$

$\frac{x^3}{b^3} = \frac{125}{64} \Rightarrow b = \frac{4x}{5}$

A/Q $\frac{\frac{4}{3}\pi \times \frac{64x^3}{125}}{\frac{4}{3}\pi \times \frac{x^3}{27}} = \frac{1}{m}$

$\frac{1}{m} = \frac{64 \times 27}{125}$

$m = \frac{125}{1728}$

143.

$\pi r^2 h = 616 \times 1000\,cm^3$

$\frac{22}{7} \times 14 \times 14 \times h = 616 \times 1000$

$h = 1000cm$

$h = 10m$

144.

Let $\frac{2\pi\theta}{360} = w$

$\frac{1}{2} w r^2 = 209$

$wr^2 = 418 - (1)$

$wr + 2r = 63$

$wr^2 + 2r^2 = 63r$

$2r^2 - 63r + 418 = 0$

$(r - 22)(2r - 19) = 0$

$r = 22, \frac{19}{2}$

$2 \times \pi \times 22 \times 22 \times \frac{\theta}{360} = 418$

$\theta = 49.46$

145.

Total perimeter $= 2 \times \frac{22}{7} \times 21$

$= 132$

Remaining $= 132 \times \frac{75}{100} = 99$

$99 + 21 + 21 = 141$

r

146.

$L = \frac{2\pi r \times 60}{360}$

$= \frac{2 \times 3.14 \times 24}{6}$

$P = 8 \times 3.14 + 48$

$= 73.12$

147. END

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Trigonometry

CGL MAINS 2019

Q1. $\frac{secA(secA+tanA)(1-sinA)}{(cosec^2A-1)\sin^2 A}$ Is equal to:
(a) Cos^2A (b)Cot A (c)Cos A (d)Sec^2A

Q2. If $\sin(x+y)=\cos(x-y)$, then the value of $\cos^2 x$ is:
(a) 3 (b) ½ (c) 5 (d) 1/4

Q3. If $3\sin x+4\cos x=2$, then the value of $3\cos x-4\sin x$ is equal to:
(a)$\sqrt{23}$ (b) 21 (c)$\sqrt{21}$ (d) $\sqrt{29}$

Q4. $\frac{\sin\theta(1-\tan\theta)\tan\theta+\sec^2\theta)}{(1-\sin\theta)\tan\theta(1+\tan\theta)(\sec\theta+\tan\theta)}$ is equal to:
(a) -1 (b) $\sin\theta\cos\theta$ (c) $Cosec\theta sec\theta$ (d) 1

Q5. $\left(\frac{1}{\cos A}-\frac{1}{\sin A}\right)+\frac{1}{cosec\,A-cotA}-\frac{1}{secA+tanA}$
(a) SinA CosA (b) SinA TanA
(c) SecA CosecA (d) CosecA CotA

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Q6. If $\sin A=\frac{4}{5}$, find the value of $\sin 3A$.
(a)$\frac{12}{25}$ (b)$\frac{44}{125}$ (c)$\frac{64}{125}$ (d)$\frac{32}{45}$

Q7 $\frac{\sqrt{cosec\,x-1}}{\sqrt{cosec\,x+1}}$ is equal to:
(a) Secx-Tanx (b) Tanx-Secx
(c) Secx.Tanx (d) Tanx+Secx

Q8. The elimination of A from xcosA-ysinA = 2 and xsinA+ycosA = 4 will give:
(a) $x^2+y^2=20$ (b) $3x^2+y^2=20$
(c)$3x^2-y^2=20$ (d) $x^2-y^2=20$

Q9 Find the smallest positive angle which satisfies the given trigonometric equation: $2\sin^2x+\sqrt{3}\cos x+1=0$
(a) $\pi/6$ (b) $\pi/3$ (c) $5\pi/6$ (d)$2\pi/3$

Q10. If $\sin x=\frac{2}{3}$, then find the value of $\cos 3x$.
(a) 0.5678 (b) 0.6735 (c) -0.8765 (d) -0.5797

Q11. If tanA+cotA = 6, then find the value of $\tan^2A+\cot^2A$.
(a) 26 (b) 34 (c) 36 (d) 34

Q12. If 117 Cos^2A + 129 Sin^2A =120 and 170 Cos^2B+158 Sin^2B = 161, then the value of $Cosec^2A$ Sec^2B is:
(a) 4 (b) 1 (c) 16 (d) 9

Q13. If CosA, SinA, CotA are in geometric progression, then the value of $\tan^6 A-\tan^2 A$ is :
(a) 1/3 (b) 3 (c) 1/2 (d) 1

Q14. If $\frac{1+sinA-cosA}{1+sinA+cosA}+\frac{1+sinA+cosA}{1+sinA-cosA}=4$, then which of the values suitable for A?
(a) 45^0 (b) 30^0 (c) 60^0 (d) 90^0

Q15. $\frac{\cot x}{1+cosec\,x}+\frac{1+cosec\,x}{\cot x}$ is equal to:
(a) 2secx (b) 2sinx (c) 2cosecx (d) 2cosx

Q16. If SecA and SinA (0<A<90) are the roots of the equation $\sqrt{6}x^2-kx+\sqrt{6}=0$, then the value of k is:
(a)$\sqrt{3}$ (b)$3\sqrt{2}$ (c) $3\sqrt{3}$ (d) $2\sqrt{3}$

Q17. Which of the following values suits for A to make the equation $\frac{Atan62°sec28°cot38°}{cosec62°tan11°}=1$ true?

(a)$\frac{\tan 38}{\tan 79°\tan 28°}$ (b)$\frac{\tan 38°\tan 79°}{\tan 28°}$

(c)$\frac{\tan 28°\tan 79°}{\tan 38°}$ (d)$\frac{\tan 28°\tan 38°}{\tan 79°}$

Q18. If $\tan^4 x-\tan^2 x=1$ then the value of $\sin^4 x+\sin^2 x$ is:
(a) 1 (b) ½ (c) 3/2 (d) ¾

Q19. The least value of $8cosec^2x+25\sin^2 x$ is:
(a) $10\sqrt{2}$ (b) $20\sqrt{2}$ (c) $30\sqrt{2}$ (d) $40\sqrt{2}$

CGL PRE 2019

Q20 Find the value of $\frac{tan60°-tan15°}{1+tan60°tan15°}$
(a) 5/4 (b) 2 (c) 1 (d) ½

Q21. If $xcosA-ysinA=1$ and $xsinA+ycosA=4$, then the value of $17x^2+17y^2$ is:
(a) 289 (b) 0 (c) 49 (d) 7

Q22. If $\cos^2 A-\sin^2 A=\tan^2 B$, then which of the following, is true?
(a) CosA CosB = 1 (b) $Cos^2B-Sin^2B=Cot^2A$
(c) $Cos^2B-Sin^2B=Tan^2A$ (d) CosA CosB =$\sqrt{2}$

CHSL 13-12-2019

CGL MAINS 2019

Q23. Find the value of $\sqrt{\frac{cosecB-cotB}{cosecB+CotB}}\div\frac{sinB}{1+cosB}$ is equal to:
(a) ½ (b) SecB (c) 1 (d) CosecB

Q24. The Value of $(tan29°cot61°-cosec^261°)+\cot^2 54°-\sec^2 36°+(\sin^2 1°+\sin^2 3°+\sin^2 5°+\ldots\ldots+\sin^2 89°)$ is:
(a) 22 (b) 20 ½ (c) 22 ½ (d) 21

Q25. If SecA + TanA = p, (p>1) then $\frac{cosecA+1}{cosecA-1}$ =?
(a) $\frac{p+1}{p-1}$ (b) $2p^2$ (c) p^2 (d) $\frac{p-1}{p+1}$

Q26. The value of
(1+cotx-cosecx) (1+cosx+sinx)secx = ?
(a) sinxcosx (b) secxcosecx (c) -2 (d) 2

CGL PRE 2018

Q27. Let $a=\frac{2\sin x}{1+\sin x+\cos x}$ and $b=\frac{c}{1+\sin x}$, then, a = b, if c = ?
(a) 1-sinx.cosx (b) 1+sinx-cosx
(c) 1+cosx-sinx (d)1+sinx.cosx

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Q28. If $\frac{\cos x}{\sin x+\cos y}+\frac{\cos y}{\sin y-\cos x}=\frac{A}{\sin x+\cos y}+\frac{\cos y}{\sin y+\cos x}$ then, A is Equal to :

(a) Cosy (b) Cosx (c) Siny (d) Sinx

CGL MAINS 2018

Q29. $\frac{(2\sin A)(1+\sin A)}{1+\sin A+\cos A}$ is equal to:

(a) 1+SinA-CosA (b) 1-SinACosA

(c) 1+CosA-SinA (d) 1+SinACosA

Q30 $\sqrt{\frac{\cot A+\cos A}{\cot A-\cos A}}$ is equal to

(a) SecA+TanA (b) SecA-TanA

(c) 1+SecA.TanA (d) 1-SecA.TanA

Q31. The value of $\frac{\sec p(1-\sin p)(\sin p+\cos p)(\sec p+\tan p)}{\sin p(1+\tan p)+\cos p(1+\cot p)}$ Is equal to:

(a) 2cosp (b) 2sinp

(c) sinpcosp (d) cosecpsecp

Q32 $(\sec p-\tan p)^2(1+\sin P)^2 \div \sin^2 p$ = ?

(a) $\cos^2 p$ (b) cosp (c)$\cot^2 p$ (d) secp

Q33. If $5\cos x - 12\sin x = 0$,, the value of $\frac{2\sin x+\cos x}{\cos x-\sin x}$.

(a) $2\frac{34}{35}$ (b) $3\frac{1}{7}$ (c) 2/3 (d) $1\frac{75}{119}$

CPO (16-03-2019)

CHSL 2019

Q34. Find the simplified value.

$\frac{\sin^3 21°+\cos^3 19°}{\sin 21°+\cos 19°}+\sin^2 69°+\cos^2 71°+\frac{1}{\sec 69°\,\mathrm{cosec}\,71°}$

(a) 4 (b) 2 (c) 1 (d) 3

Q35. For all a'is, (i = 1,2,3.....30) lying between 0^0 and 90^0, it is given that $\cos a_1+\cos a_2+\cos a_3$.....$\cos a_{20}$ = 20. What is the value (in degrees) of $(a_1+a_2+a_3.....a_{20})$?

(a) 900^0 (b)0^0 (c) 1800^0 (d)20^0

Q36. $\frac{1}{\sec A-\tan A}-\frac{1}{\cos A}=\sec A\times K$, If $0^0<A<90^0$, then k is equal to?

(a) tan A (b) cot A (c) Cosec A (d) SinA

Q37. If $\left(\frac{1}{1+\mathrm{cosec}\,x}-\frac{1}{1-\mathrm{cosec}\,x}\right)\cos x=2,\ 0°<x<90°$, then the value of $\sin^2 x+\cot^2 x+\sec^2 x$ is:

(a) 2 ½ (b) 3 ½ (c) 2 (d) 1

Q38. For $0°<x<90°$, If $\frac{\sec x(1-\sin x)(\sec x+\tan x)}{(\sec x-\tan x)^2}=\frac{1+k}{1-k}$, then the k is equal to:

(a) cosx (b) secx (c) sinx (d) cosecx

Q39. If $SecA = 3x$ and $tanA = \frac{3}{x}$, $(x \neq 0)$ then the value of $9\left(x^2-\frac{1}{x^2}\right)$ is:

(a) ½ (b) 1 (c) ¼ (d) 1/3

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Q40. If $\left(\frac{\tan x-\sec x+1}{\tan x+\sec x-1}\right)\sec x=\frac{1}{k}$ then k=?

(a) 1-cosx (b) 1-sinx (c) 1+sinx (d) 1+cosx

Q41. If $\frac{\tan A}{1-\cot A}+\frac{\cot A}{1-\tan A}=1+k$ then, k=?

(a) CosecA SecA (b) CotA+SecA

(c) TanA CosecA (d) TanA+SecA

Q42 If $\mathrm{Cos}^2x-\mathrm{Sin}^2x-3\cos x+2=0$, $0^0<x<90^0$, then what is the value of 4Cosecx+Cotx?

(a) 4 (b) $4\sqrt{3}$ (c) $3\sqrt{3}$ (d)3

Q43 $\frac{(\sec y+\tan y)(1-\sin y)}{\mathrm{cosec}\,y(1+\cos y)(\mathrm{cosec}\,y-\cot y)}$ is equal to:

(a) secy (b) siny (c) cosecy (d) $\cos^2 y$

Q44. If $\sqrt{\frac{1-\cos A}{1+\cos A}}\times\sqrt{\frac{\mathrm{cosec}\,A-\cot A}{\mathrm{cosec}\,A+\cot A}}=\frac{1-r}{1+r}$ then, the value of r is:

(a) secA (b) cosecA (c) cosA (d) sinA

Q45. $(\mathrm{cosecA-SinA})^2+(\mathrm{secA-cosA})^2-(\mathrm{cotA-tanA})^2$ is equal to:

(a) 0 (b) 2 (c) -1 (d) 1

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Q46. The value of $\sqrt{sec^2x+cosec^2x}\times\sqrt{tan^2x-sin^2x}$ is equal to:

(a) sinx $\sec^2$x (b) cosecx $\cos^2$x

(c) sinx $\cos^2$x (d)cosecx $\sec^2$x

Q 47. $\frac{\sin y-\cos y+1}{\sin y+\cos y-1}$ =?

(a) secy-tany (b) secy tany

(c) secy+tany (d) secy siny

Q48 If $(1+\tan^2 x)+(1+(\tan^2 x)^{-1})=k$, then $\sqrt{k}$ = ?

(a)sinx cosx (b) sinx secx

(c) cosecx cosx (d) cosecx secx

Q49. The value of $\frac{1}{\sec x-\tan x}-\frac{1}{\cos x}$, $0°<x<90°$, is equal to:

(a) tanx (b) 2cosx (c) cotx (d) 2secx

Q50 $\left(\frac{\sin A-2\sin^3 A}{2\cos^3 A-\cos A}\right)^2+1=?\ (A\neq 45°)$

(a) $2\tan^2 A$ (b) $\sec^2 A$ (c) $\cot^2 A$ (d) $\mathrm{cosec}^2 A$

Q51. If secx-tanx = P, then cosecx = ?

(a)$\frac{2P}{1+P^2}$ (b)$\frac{1-P^2}{1+P^2}$ (c)$\frac{P^2+1}{1-P^2}$ (d)$\frac{2P}{1-P^2}$

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Q.52 If $\frac{\cos^2\theta}{\cot^2+\sin^2\theta-1}=3,\ 0°<\theta<90°$, then the value of $(tan\theta+cosec\theta)$ is:

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(a)$2\sqrt{3}$ (b)$\frac{5\sqrt{3}}{3}$ (c)$3\sqrt{3}$ (d)$\frac{4\sqrt{3}}{3}$

Q.53 $1+2\tan^2\theta+2\sin\theta\sec^2\theta$, $0°<\theta<90°$, is equal to:
(a)$\frac{1-\sin\theta}{1+\sin\theta}$ (b)$\frac{1+\cos\theta}{1-\cos\theta}$ (c)$\frac{1-\cos\theta}{1+\cos\theta}$ (d)$\frac{1+\sin\theta}{1-\sin\theta}$

Q.54 If $\cos\theta-\sin\theta=\sqrt{3}\cos(90°-\theta)$, $0°<\theta<90°$, then find the value of $\tan\theta-\cot\theta$.
(a)$\frac{3+2\sqrt{3}}{(1+\sqrt{3})}$ (b)$-\frac{3+2\sqrt{3}}{(1+\sqrt{3})}$ (c)$-\frac{3+2\sqrt{3}}{(1-\sqrt{3})}$ (d)$\frac{3-2\sqrt{3}}{(1+\sqrt{3})}$

Q.55 If $4\sin^2(2x-10)°=3$, $0\le(2x-10)\le 90$, then find the value of $\frac{\sin^4(x-5)°+\cos^4(x-5)°}{1-2\sin^2(3x-15)°\cos^2(3x-15)°}$.
(a)1 (b)$\frac{5}{8}$ (c)$-\frac{5}{8}$ (d)-1

Q.56 If $\sin^6\theta+\cos^6\theta=\frac{1}{2}$, $0°<\theta<90°$, then what is the value of $\sin\theta\cos\theta$?
(a)$\frac{\sqrt{6}}{6}$ (b)$\frac{\sqrt{2}}{3}$ (c)$\frac{\sqrt{2}}{\sqrt{3}}$ (d)$\frac{2}{9}$

Q.57 Find the value of $\frac{\tan^2 30°}{\sec^2 30°}+\frac{\operatorname{cosec}^2 45°}{\cot^2 45°}-\frac{\sec^2 60°}{\operatorname{cosec}^2 60°}$.
(a)$-\frac{3}{4}$ (b)$\frac{5}{4}$ (c)$\frac{13}{4}$ (d)$\frac{23}{12}$

Q.58 If $0°<\theta<90°$, $\sqrt{\frac{\sec^2\theta+\operatorname{cosec}^2\theta}{\tan^2\theta-\sin^2\theta}}$ is equal to:
(a)$\sec^3\theta$ (b)$\sin^2\theta$ (c)$\operatorname{cosec}^3\theta$ (d)$\sec^2\theta$

Q.59 If $\frac{\sin^2\theta}{\tan^2\theta-\sin^2\theta}=5$, θ is an acute angle, then the value of $\frac{24\sin^2\theta-15\sec^2\theta}{6\operatorname{cosec}^2\theta-7\cot^2\theta}$ IS:
(a)2 (b)-14 (c)14 (d)-2

Q.60 If $\sin\alpha+\sin\beta=\cos\alpha+\cos\beta=1$, then $\sin\alpha+\cos\alpha=?$
(a)2 (b)0 (c)1 (d)-1

Q.61 Simplify $\sec^2\alpha\left(1+\frac{1}{\operatorname{cosec}\alpha}\right)\left(1-\frac{1}{\operatorname{cosec}\alpha}\right)$.
(a)$\tan^4\alpha$ (b)-1 (c)1 (d)$\sin^2\alpha$

Q.62 The value of $\frac{\sec^2 60°\cos^2 45°+\operatorname{cosec}^2 30°}{\cot 30°\sec^2 45°-\operatorname{cosec}^2 30°\tan 45°}$ is:
(a)$3(2-\sqrt{3})$ (b)$-3(2-\sqrt{3})$
(c)$3(2+\sqrt{3})$ (d)$-3(2+\sqrt{3})$

Q.63 If $\sin^2\theta=2\sin\theta-1$, $0°\le\theta\le 90°$, then find the value of $\frac{1+\operatorname{cosec}\theta}{1-\cos\theta}$.
(a)-1 (b)1 (c)2 (d)-2

CHSL 2020

Q.64 If $\cos\theta=\frac{4x}{1+4x^2}$, then what is the value of $\sin\theta$?
(a)$\frac{1+4x^2}{1-4x^2}$ (b)$\frac{1+4x^2}{4x^2}$ (c)$\frac{1-4x^2}{1+4x^2}$ (d)$\frac{1-4x^2}{4x}$

Q.65 The value of $\frac{\cos 8°\cos 24°\cos 60°\cos 66°\cos 82°}{\sin 82°\sin 66°\sin 60°\sin 8°\sin 24°}$ is:
(a)1 (b)$\frac{1}{\sqrt{2}}$ (c)$\frac{1}{\sqrt{3}}$ (d)0

Q.66 Evaluate the following expression.
$\frac{3(\cot^2 46°-\sec^2 44°)}{2(\sin^2 28°+\sin^2 62°)}+\frac{2\cos^2 60°\tan^2 33°\tan^2 57°}{\sec^2(90-\theta)-\cot^2\theta}$
(a)-1 (b)1 (c)-2 (d)2

Q.67 If $\frac{5\cot\theta+\sqrt{3}\operatorname{cosec}\theta}{2\sqrt{3}\operatorname{cosec}\theta+3\cot\theta}=1$, $0°<\theta<90°$, then the value of $\frac{\frac{7}{2}\cot^2\theta-\frac{3}{4}\operatorname{cosec}^2\theta}{4\sin^2\theta+\frac{3}{2}\tan^2\theta}$ will be:
(a)7 (b)2 (c)3 (d)5

Q.68 The value of $\cot^2 46°-\sec^2 44°+(\sin^2 1°+\sin^2 3°+\sin^2 5°+\ldots\ldots+\sin^2 89°)$ is:
(a)23.5 (b)20.5 (c)22.5 (d)21.5

Q.69 If $(1+\cot^2\theta)+(1+(\cot^2\theta)^{-1})$ is equal to k, then $\sqrt{k}=?$
(a) $\sin\theta\sec\theta$ (b) $\operatorname{cosec}\theta\cos\theta$
(c) $\operatorname{cosec}\theta\sec\theta$ (d) $\sin\theta\cos\theta$

Q.70 If $3\sin^2 A+4\cos^2 A-3=0$, then the value of $\cot A$ $(where\ 0°\le A\le 90°)$ is:
(a)∞ (b)0 (c)1 (d)not defined

Q.71 If $\cot A+\operatorname{cosec} A=2$ and A is an acute angle, then the value of $\frac{9\tan A+16\operatorname{cosec} A}{5\sin A+3\tan A}$ is:
(a)3 (b)6 (c)4 (d)8

Q.72 If $\cot^2\theta+\cot^4\theta=2$, then the value of $2\sin^4\theta+\sin^2\theta$ is:
(a)3 (b)5 (c)1 (d)2

Q.73 If $\sin\alpha+\cos\alpha=\tan\frac{\pi}{3}$, then the value of $(\sin^3\alpha+\cos^3\alpha)$ is equal to:
(a)$\frac{1}{2}$ (b)1 (c)0 (d)$\frac{3}{2}$

Q.74 If $\operatorname{cosec}\theta=\frac{\sqrt{5}}{2}$, then what will be the value of $(\sec\theta+\tan\theta-\cot\theta\sin\theta)$?
(a)$2+\frac{4\sqrt{5}}{5}$ (b)$2+\sqrt{5}$
(c)$2+\frac{\sqrt{5}}{2}$ (d)$2+\frac{2\sqrt{5}}{5}$

Q.75 If $8\sin^2\theta+2\cos\theta=5$, $0°<\theta<90°$, then the value of $\tan^2\theta+\sec^2\theta-\sin^2\theta$ will be:
(a)$\frac{305}{144}$ (b)$\frac{431}{144}$ (c)$\frac{23}{9}$ (d)$\frac{153}{72}$

Q.76 If $3\cot^2 x-7\operatorname{cosec}^2 x+7=0$, then the value of $x(0°\le x\le 90°)$ is:
(a)60° (b)0° (c)30° (d)90°

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Q.77 If $5\sin^2\theta = 3(1+\cos\theta)$, $0° < \theta < 90°$, then the value of $\operatorname{cosec}\theta + \cot\theta$ is:

(a) $\sqrt{\frac{7}{3}}$ (b) $\frac{5}{\sqrt{21}}$ (c) $\frac{4}{\sqrt{21}}$ (d) $\sqrt{\frac{3}{7}}$

Q.78 If $\frac{\operatorname{cosec}\theta+\cot\theta}{\operatorname{cosec}\theta-\cot\theta} = 7$, then the value of $\frac{4\sin^2\theta+5}{4\sin^2\theta-1}$ is:

(a)15 (b)3 (c)9 (d)12

Q.79 If $Y = \tan35°$, then the value of $(2\tan55° + \cot55°)$ is:

(a) $\frac{2+Y^2}{Y}$ (b) $\frac{2-Y}{Y^2}$ (c) $\frac{2}{Y^2}$ (d) $\frac{2-Y^2}{Y}$

Q.80 If $\tan\theta + \cot\theta = 4$, then the ratio of $3(\tan^2\theta + \cot^2\theta)$ to $(2\operatorname{cosec}^2\theta\sec^2\theta - 4)$ will be:

(a)4:3 (b)3:4 (c)5:4 (d)3:2

Q81 If $\sin\theta = \frac{12}{13}$, then $\frac{\sin^2\theta-\cos^2\theta}{2\cos\theta\sin\theta} \times \cot^2\theta = ?$

(a) $\frac{595}{1152}$ (b) $\frac{119}{864}$ (c) $\frac{119}{144}$ (d) $\frac{595}{3456}$

Q.82 $\frac{(1+\cos\theta)(\operatorname{cosec}\theta-\cot\theta)\sec\theta}{\sin\theta(1-\sin\theta)(\sec\theta+\tan\theta)} = ?$

(a)$\sec^2\theta$ (b)$\sin^2\theta$

(c)$\cos^2\theta$ (d)$\operatorname{cosec}^2\theta$

Q.83 If $3\cos^2\theta - 4\sin\theta + 1 = 0$, $0° < \theta < 90°$, then the value of $3\cos^2\theta + 5\tan^2\theta$ will be:

(a) $5\frac{1}{5}$ (b) $5\frac{2}{3}$ (c) $5\frac{4}{5}$ (d) $6\frac{2}{3}$

Q.84 If $\sin\theta = \frac{2\sqrt{ab}}{a+b}$, $a > b > 0$, then the value of $\frac{\cos\theta+1}{\cos\theta-1}$ will be:

(a) $-\frac{b}{a}$ (b) $-\frac{a}{b}$ (c) $\frac{a}{b}$ (d) $\frac{b}{a}$

Q. 85 The value of $\frac{3\cos^2 27°-5+3\cos^2 63°}{\tan^2 32°+4-\operatorname{cosec}^2 58°} + \sin35°\cos55° + \cos35°\sin55°$ is :

(a) $-\frac{1}{4}$ (b) $-\frac{1}{3}$ (c) $\frac{1}{3}$ (d) $1\frac{2}{3}$

SSC SELECTION PHASE IX

Q.86 The value of $\frac{\tan^2(22°-\theta)-\tan(\theta+68°)-\operatorname{cosec}^2(68°+\theta)+\cot(22°-\theta)}{3(\cot^2 52°-\sec^2 38°)+2(\operatorname{cosec}^2 28°-\tan^2 62°)}$ is:

(a) 0 (b) -1 (c) 1 (d) $\frac{1}{5}$

Q.87 If $\cos^2\theta - \sin^2\theta - 3\cos\theta + 2 = 0$, $0° < \theta < 90°$, then what is the value of $5\cos\theta - \frac{\tan\theta}{2}$?

(a) $\frac{5+\sqrt{3}}{2}$ (b) $\frac{5-\sqrt{3}}{2}$ (c) $\frac{3+\sqrt{3}}{2}$ (d) $\frac{3-\sqrt{3}}{2}$

SSC CGL PRE 2021

Q88. If $\sec A = \frac{17}{8}$, given that $A < 90°$, what is the value of the following? $\frac{34\sin A+15\cot A}{68\cos A-16\tan A}$

a) 23 b) 19 c) 30 d) 38

Q89. The value of $1 + \sqrt{\frac{\cot\theta+\cos\theta}{\cot\theta-\cos\theta}}$, if $0° < \Theta < 90°$, is equal to:

a) $1 - \sec\theta + \tan\theta$ b) $1 - \sec\theta - \tan\theta$

c) $1 + \sec\theta - \tan\theta$ d) $1 + \sec\theta + \tan\theta$

Q90. $\tan^2 A + 5\sec A = 13$, where $0 < A < 90°$ solve for A (in degrees).

a) 0 b) 60 c) 45 d) 30

Q91. If $5\sin\Theta - 4\cos\Theta = 0$, $0° < \Theta < 90°$, then the value of $\frac{5\sin\theta-\cos\theta}{5\sin\theta+3\cos\theta}$ is:

a) $\frac{2}{7}$ b) $\frac{3}{7}$ c) $\frac{6}{7}$ d) $\frac{4}{7}$

Q92. The value of $2 - \sqrt{\frac{\cot\theta+\cos\theta}{\cot\theta-\cos\theta}}$, when $0° < \Theta < 90°$ is equal to:

a) 2+secΘ - tanΘ b) 2+secΘ + tanΘ

c) 2-secΘ - tanΘ d) 2-secΘ+tanΘ

Q93. If $3\sin^2\Theta + 4\cos\Theta - 4 = 0$, $0° < \Theta < 90°$, then the value of $(\operatorname{cosec}^2\Theta + \cot^2\Theta)$ is:

a) $\frac{17}{9}$ b) $\frac{25}{3}$ c) $\frac{4}{3}$ d) $\frac{5}{4}$

Q94. If $6\tan A(\tan A + 1) = 5 - \tan A$, Given that $0 < A < \frac{\pi}{2}$ what is the value of $(\sin A + \cos A)$?

a) $5\sqrt{3}$ b) $\frac{5}{\sqrt{3}}$ c) $3\sqrt{5}$ d) $\frac{3}{\sqrt{5}}$

Q95. If $\frac{\sin^2\phi-3\sin\phi+2}{\cos^2\phi} = 1$, *where* $0° < \phi < 90°$, then what is the value of $(\cos2\phi - \sin3\phi + \operatorname{cosec}2\phi)$?

a) $\frac{-3-4\sqrt{3}}{6}$ b) $\frac{-3+4\sqrt{3}}{6}$

c) $\frac{3+4\sqrt{3}}{6}$ d) $\frac{3-4\sqrt{3}}{6}$

SSC CGL MAINS 2020

Q96. $\frac{(1+\sec\theta\operatorname{cosec}\theta)^2(\sec\theta-\tan\theta)^2(1+\sin\theta)}{(\sin\theta+\sec\theta)^2+(\cos\theta+\operatorname{cosec}\theta)^2}$, $0 < \theta < 90$,

is equal to:

(a) 1 – cos θ (b) Sin θ

(c) 1- sin θ (d) Cos θ

Q97. If $\frac{\sec\theta-\tan\theta}{\sec\theta+\tan\theta} = \frac{1}{7}$, θ lies in first quadrant, then the value of $\frac{\operatorname{cosec}\theta+\cot^2\theta}{\operatorname{cosec}\theta-\cot^2\theta}$ is:

(a) $\frac{19}{5}$ (b) $\frac{22}{3}$ (c) $\frac{37}{12}$ (d) $\frac{37}{19}$

Q98. The expression $\frac{\tan^6\theta-\sec^6\theta+3\sec^2\theta\tan^2\theta}{\tan^2\theta+\cot^2\theta+2}$, $0° < \theta < 90°$,

(a) $\sec^2\theta\operatorname{cosec}^2\theta$ (b) $-\sec^2\theta\operatorname{cosec}^2\theta$

(c) $\cos^2\theta\sin^2\theta$ (d) $-\cos^2\theta\sin^2\theta$

Q99 The expression $\frac{\cos^4\theta-\sin^4\theta+2\sin^2\theta+3}{(\operatorname{cosec}\theta+\cot\theta+1)(\operatorname{cosec}\theta-\cot\theta+1)-2}$, $0° < \theta < 90°$,

is equal to:

(a) $\frac{1}{2}\sin\theta$ (b) $2\sin\theta$ (c) $\sin\theta$ (d) $2\operatorname{cosec}\theta$

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Q100. The expression $\frac{(1-\sin\theta+\cos\theta)^2(1-\cos\theta)\sec^3\theta\,\mathrm{cosec}^2\theta}{(\sec\theta-\tan\theta)(\tan\theta+\cot\theta)}$, $0° < \theta < 90°$, is equal to:

(a) sin Θ (b) 2 cos Θ (c) cot Θ (d) 2 tan Θ

DP 2022

Q101. The value of $\sin^2 5° + \sin^2 10° + \sin^2 15° + \ldots\ldots + \sin^2 85° + \sin^2 90°$ is equal to:

a) $9\frac{1}{2}$ b) 9
c) $8\frac{1}{2}$ d) 8

Q102. In a triangle ABC, D and E are points on AB and AC such that AD = 1/3 AB, and AE = 1/3 AC. If BC = 18 cm, then the length of DE is:

a) 18 cm b) 6 cm
c) 12 cm d) 3 cm

Q103. The value of sin10° .sin50° .sin60° .sin70° is:

a) $\frac{\sqrt{3}}{16}$ b) $\frac{\sqrt{3}}{15}$
c) $\frac{\sqrt{3}}{4}$ d) $\frac{\sqrt{3}}{2}$

Q104. If sinΘ + cosΘ = K and secΘ + cosecΘ = m, find the value of $m(K^2 - 1)$.

a) 2M b) K c) 2K d) M

Q105. If cosecΘ + cotΘ = 2/5, the value of sinΘ is:

a) $\frac{20}{29}$ b) $\frac{20}{39}$ c) $\frac{39}{20}$ d) $\frac{29}{20}$

Q106. Evaluate the following:

$$\frac{\cos2\theta.\cos3\theta - \cos2\theta.\cos7\theta + \cos\theta.\cos10\theta}{\sin4\theta.\sin3\theta - \sin2\theta.\sin5\theta + \sin4\theta.\sin7\theta}$$

a) cos6Θ.cos5Θ b) cot6Θ.cos5Θ
c) −cot6Θ.cot5Θ d) cos6Θ.cot5Θ

Q107. Solve the following to find its value in terms of trigonometric ratios.

$$\frac{\tan A + \sec A - 1}{\tan A - \sec A + 1}$$

a) $\frac{1+\cos A}{\sin A}$ b) $\frac{1-\sin A}{\cos A}$
c) $\frac{1+\sin A}{\cos A}$ d) $\frac{1-\cos A}{\sin A}$

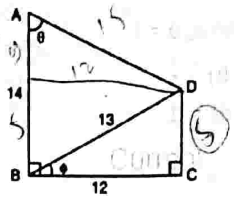
Q108. If $\frac{\cos(x+A)}{a} = \frac{\cos(x+2A)}{b} = \frac{\cos(x+3A)}{c}$ and A = 60°, x = 15°, then the value of $\left(\frac{a+c}{b}\right)^2 + \left(\frac{a-c}{b}\right)^2$ is _____.

a) 0 b) 2 c) 4 d) 1

Q109. $(\sin\theta + \mathrm{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2 - 1 =$ _____?

a) $6 - \sin^2\theta + \cos^2\theta$ b) $\tan^2\theta - \cot^2\theta$
c) $\sin^2\theta - \cos^2\theta$ d) $6 + \tan^2\theta + \cot^2\theta$

Q110. Using the measurements givens in the following figure, the value of $\frac{\sin\phi+\tan\theta}{\sin\phi-\tan\theta}$ is _____?



a) $\frac{6}{35}$ b) $-\frac{67}{37}$ c) $-\frac{7}{32}$ d) $\frac{7}{3}$

Q111. If sinA + cosA = √7, then tanA + cotA is equal to:

a) 1 b) 3 c) 0 d) 1/3

Q112. If x = sin130° cos80°, y = sin80° cos130°, and z = 1 + xy, then which of the following is true?

a) x > 0, y < 0 and 0 < z < 1 b) x > 0, y > 0 and z > 0
c) x < 0, y < 0 and 0 < z < 1 d) x > 0, y < 0 and z > 1

Q113. The value of $\frac{\sec\theta(\sin\theta-2\sin^3\theta}{2\cos^3\theta-\cos\theta}$ is:

a) sinΘ.cosΘ b) secΘ.tanΘ
c) tanΘ.cosΘ d) secΘsinΘ

CPO PRE 22

Q114. If $x = \frac{2\sin\theta}{(1+\cos\theta+\sin\theta}$, then the value of $\frac{1-\cos\theta+\sin\theta}{(1+\sin\theta)}$ is:

a) $\frac{x}{(1+x)}$ b) x c) $\frac{1}{x}$ d) $\frac{(1+x)}{x}$

Q115. If $\left\{\left(\frac{\sec\theta-1}{\sec\theta+1}\right)\right\}^n = \mathrm{ceosec}\theta - \cot\theta$, then n = ?

a) 1 b) 0.5 c) -1 d) -0.5

Q116. The value of $(2\cos^2\theta - 1)\left[\frac{1+\tan\theta}{1-\tan\theta} + \frac{1-\tan\theta}{1+\tan\theta}\right]$ is:

a) 2 b) 0 c) $\frac{\sqrt{3}}{2}$ d) 1

Q117. If cosΘ + sinΘ = √2 cosΘ, find the value of (cosΘ − sinΘ).

a) √2 sinΘ b) √2 cosΘ
c) $\frac{1}{\sqrt{2}}$ sinΘ d) $\frac{1}{2}$ cosΘ

Q118. If $1 + \sin^2\theta - 3\sin\theta\cos\theta = 0$, then the value of cotΘ is:

a) 0 b) 2 c) ½ d) 1/3

Q119. If $\cos^4 a - \sin^4 a = 5/6$, then the value of $2\cos^2 a - 1 =$ _____.

a) 11/6 b) 5/6 c) 6/11 d) 6/5

Q120. If cosA = sinA, and $a\sin^{12}A + b\sin^{10}A + c\sin^8A + \sin^6A = 1$, then a + b + c = ?

a) 7 b) 8 c) 9 d) 6

Q121. Simplify.

$$\cos(36° - A)\cos(36° + A) + \cos(54° - A)\cos(54° + A)$$

a) cos A b) sin 2A c) cos 2A d) sin A

CGL PRE 2022

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Q122. If $2\frac{\cos^2x-\sec^2}{\tan^2x} = a + b\cos 2x$, then a, b = ?

a) $\frac{-3}{2}, \frac{-1}{2}$ b) $\frac{3}{2}, \frac{1}{2}$

c) -3, -1 d) 3, 1

Q123. $\Theta = 135°; \gamma = 15°$

What is the value of 2 cos(Θ) sin(γ)?

a) $\frac{\sqrt{3}-2}{2}$ b) $\frac{1-\sqrt{3}}{2}$

c) $2-\sqrt{3}$ d) $\sqrt{3}-2$

Q124. If sec x − cos x = 4, then what will be the value of $\frac{(1+\cos^2x)}{\cos x}$?

a) 9/4 b) 1/4 c) $2\sqrt{5}$ d) $\sqrt{5}$

Q125. If $\tan(\alpha+\beta) = \sqrt{3}, \tan(\alpha-\beta) = 1$ where $(\alpha+\beta)$ and $(\alpha-\beta)$ are acute angles, then what is $\tan(6\alpha)$?

a) -1 b) 0 c) 1 d) √2-1

Q126. If sin Y = x, then what will be the value of cos 2Y (where $0 \le Y \le 90°$)?

a) $(\sqrt{2}-1)x$ b) $\sqrt{2}x$ c) $1-2x$ d) $1-2x^2$

Q127. If A + B ± C, then tan A tan B tan C = ?

a) tan C + tan A- tan B b) tan C + tan A + tan B

c) tan A – tan B – tan C d) tan C – tan A – tan B

Q128. What will be the value of sin10° - 4/3 $\sin^3 10°$?

a) $\frac{1}{2\sqrt{3}}$ b) $\frac{\sqrt{3}}{6}$ c) $\frac{1}{6}$ d) $\frac{1}{3\sqrt{3}}$

Q129. The value of $\frac{2\tan60°}{1+\tan^260°}$ is:

a) cos 60° b) tan 60° c) sin 60° d) sin 30°

Q130. If tanΘ + secΘ = 7, Θ being acute, then the value of 5 sin Θ is:

a) $\frac{25}{24}$ b) $\frac{24}{25}$ c) $\frac{1}{24}$ d) $\frac{24}{5}$

Q131. The value of $\tan^2\Theta + \cot^2\Theta - \sec^2\Theta\,\mathrm{cosec}^2\Theta$ is:

a) 2 b) -2 c) 0 d) ½

Q132. If $\tan^2\Theta = 1 - a^2$, then the value of $\sec\Theta + \tan^3\Theta\,\mathrm{cosec}\Theta$ is:

a) $(2-a)^{3/2}$ b) $(a^2-1)^{3/2}$

c) $(2-a^2)^{3/2}$ d) $a^{3/2}$

Q133. If cosecA – cotA = $\frac{1}{4}$, then the value of tan A is:

a) $\frac{8}{15}$ b) $\frac{8}{17}$ c) $\frac{15}{17}$ d) $\frac{17}{15}$

Q134. If $\frac{(1-\cos\theta)}{\sin\theta} = \frac{1}{5}$, then what will be the value of $\frac{(1+\cos\theta)}{\sin\theta}$?

a) 5 b) 2/5 c) 4/5 d) 1/5

Q135. Find the value of the following expression.

$5(\sin^4\Theta + \cos^4\Theta) + 3(\sin^6\Theta + \cos^6\Theta) + 19\sin^2\Theta\cos^2\Theta$

a) 8 b) 5 c) 6 d) 7

Q136. What is the value of cos45° sin15°?

a) $\frac{(\sqrt{3}-1)}{2}$ b) $\frac{(\sqrt{3}-1)}{4}$

c) $(\sqrt{3}+1)$ d) $2\sqrt{3}-1$

Q137. If 1 + sinΘ = m cosΘ, then what is the value of sinΘ?

a) $\frac{2m^2-1}{m^2+1}$ b) $\frac{m^2-1}{m^2+1}$

c) $\frac{m^2+1}{2m^2-1}$ d) $\frac{m^2+1}{m^2-1}$

Q138. If $\tan^2\Theta + \tan^4\Theta = 1$, then :

a) $\cot^2\Theta + \cot^4\Theta = 1$ b) $\cos^2\Theta + \cos^4\Theta = 1$

c) $\sin^2\Theta + \sin^4\Theta = 1$ d) $\mathrm{cosec}^2\Theta + \sec^4\Theta = 1$

Q139. If tan40° = α, then find $\frac{\tan320°-\tan310°}{1+\tan320°.\tan310°}$.

a) $\frac{1-\alpha^2}{\alpha}$ b) $\frac{1+\alpha^2}{2\alpha}$ c) $\frac{1-\alpha^2}{2\alpha}$ d) $\frac{1+\alpha^2}{\alpha}$

Q140. $\sin^4\theta + \cos^4\theta$ in terms of sinθ can be written as:

a) $2\sin^4\Theta + 2\sin^2\Theta - 1$ b) $2\sin^4\Theta - 2\sin^2\Theta$

c) $2\sin^4\Theta - 2\sin^2\Theta - 1$ d) $2\sin^4\Theta - 2\sin^2\Theta + 1$

Q141. Simplify the following:

$\frac{\cos x - \sqrt{3}\sin x}{2}$

a) $\cos\left(\frac{\pi}{3}-x\right)$ b) $\sin\left(\frac{\pi}{3}+x\right)$

c) $\cos\left(\frac{\pi}{3}+x\right)$ d) $\sin\left(\frac{\pi}{3}+x\right)$

Q142. If $\sin\Theta + \cos\Theta = \frac{\sqrt{3}-1}{2\sqrt{2}}$, then what is the value of tanΘ + cotΘ?

a) $8(\sqrt{3}-2)$ b) $12(\sqrt{3}-2)$

c) $12(\sqrt{3}+2)$ d) $8(\sqrt{3}+2)$

Q143. If $\tan^2\alpha = 3 + Q^2$, then $\sec\alpha + \tan^3\alpha\,\mathrm{cose}$

a) $(4+Q^2)^{3/2}$ b) $(7+Q^2)^{3/2}$

c) $5-Q^2)^{3/2}$ c) $(3+Q^2)^{3/2}$

CGL MAINS 2022

Q144 For what value of m will the system of equations 17x+my+102 = 0 and 23x+299y+138 = 0 have infinite number of solutions?

a) 221 b) 223 c) 220 d) 219

Q145 $(\sin\Theta + \mathrm{cosec}\Theta)^2 + (\cos\Theta + \sec\Theta)^2$= ?

a) $5 + \tan^2\Theta + \cot^2\Theta$ b) $7 + \tan^2\Theta - \cot^2\Theta$

c) $7 + \tan^2\Theta + \cot^2\Theta$ d) $5 + \tan^2\Theta - \cot^2\Theta$

CHSL PRE 22

Q146. What is the value of $\left(\frac{1+\sec^2A}{1+\cos^2A}\right)\left(\frac{1+\sin^2A}{1+\mathrm{cosec}^2A}\right)$?

a) cosec^2 A b) $\sec^2$ A

c) $\cos^2$ A d) $\tan^2$ A

Q147. What is the value of $\frac{\tan A-\sin A}{\tan A+\sin A}$?

a) 1 b) $\frac{\sec A-1}{\sec A+1}$

c) Sec A d) $\frac{\sec A+1}{\sec A-1}$

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Q148. What is the value of $\frac{1+\sin A}{\cos^2 A}$?

a) $\frac{1}{1+\cos A}$ b) $\frac{1}{1+\sin A}$

c) $\frac{1}{1-\cos A}$ d) $\frac{1}{1-\sin A}$

Q149. What is the value of $\sqrt{\frac{\text{cosec}A+1}{\text{cosec}A-1}}+\sqrt{\frac{\text{cosec}A-1}{\text{cosec}A+1}}$?

a) 2 secA
b) sec A
c) 2 cos A
d) cos A

Q150. If tanA = 3, then what is the value of 3 sinA cosA ?

a) $\frac{9}{10}$ b) $\frac{8}{9}$ c) $\frac{9}{11}$ d) $\frac{7}{9}$

Q151. If m = secθ - tanθ and n = cosecθ + cotθ, then what is the value of m + n(m – 1)?

a) 0 b) 2 c) 1 d) -1

Q152. What is the value of $(\text{sec}A-\tan A+1)(\text{sec}A-\tan A-1)$?

a) $(1+\tan A)$ b) $2\tan A(\tan A-\text{sec}A)$
c) 2 sec A d) $2\tan A$

Q153. If sec x + tan x = 5 and cosec y – cot y = 1/3, then find the value of (sec x + cosec y) – (tan x – cot y).

a) 4.2 b) 2.2 c) 3.1 d) 3.2

Q154. Simplify the following expression :

$\frac{1-\sin A}{\cos A}+\frac{\cos A}{1-\sin A}$

a) 2 secA b) 2 tan A
c) 2 sin A d) 2 cosA

Q155. What is the value of $\frac{1+\tan A}{\text{cosec}A}+\frac{1+\cot A}{\text{sec}A}$?

a) 2 cosec^2 A b) sec A + cosec A
c) sec A – cosec A d) 2 sec^2 A

Q156. If A = a cosecΘ + b cotΘ and B = a cotΘ + b cosecΘ, then find the value of $A^2 - B^2$?

a) (a – b) b) $(a^2 - b^2)$
c) (a + b) d) ab

Q157. If cosecΘ + cotΘ = s, then what is the value of cosΘ ?

a) $\frac{s^2-1}{s^2+1}$ b) $\frac{s^2+1}{s^2-1}$ c) $\frac{s^2-1}{2s}$ d) $\frac{2s}{s^2+1}$

Q158. What is the value of $\frac{1+\tan A}{\text{cosec}A}+\frac{1+\cot A}{\text{sec}A}$?

a) 2 cosec^2 A b) secA + cosecA
c) secA – cosecA d) 2 sec^2 A

Q159. If $\sin^4 x + \sin^2 x = 1$, then what is the value of $\cot^4 x + \cot^2 x$?

a) 1 b) 2 c) -3 d) -1

Q160. If sin m + sin n = p, cos m + cos n =q, then find the value of sin m x sin n + cos m x cos n.

a) $(p^2 + q^2 - 2)/2$ b) p + q + pq
c) $p^2 + q^2 - 2$ d) p + q – pq

Q161. If tan Θ + sin Θ = A and tan Θ – sin Θ = B, then what is the value of $A^2 - B^2$?

a) tan Θ b) 4 cot Θ
c) 4 tan Θ sin Θ d) 2 tan Θ sin Θ

Q162. If $(2\cos^3 A - \cos A)/(\sin A - 2\sin^3 A) = 1$, then what is the value of A?

a) 45° b)90° c) 60° d) 30°

Q163. If tan A + secA = K, then what is the value of sinA?

a) $\frac{K^2+1}{K^2-1}$ b) $\frac{K^2-1}{2K}$ c) $\frac{2K}{K^2+1}$ d) $\frac{K^2-1}{K^2+1}$

Q164. If $\sqrt{2}\,\text{sec}^2\Theta - 4\,\text{sec}\Theta + 2\sqrt{2} = 0$, then what is the value $\sin^2\Theta + \tan^2\Theta$?

a) 1/2 b) 3/2 c) 2/3 d) 5/3

ICAR & Selection Phase XI

Q165. If $\sin\Theta + \cos\Theta = \frac{\sqrt{11}}{3}$, then what is tanΘ + cotΘ equal to?

1. 11 2. 7 3. 5 4. 9

CGL PRE 23

Q166. Evaluate the following:

Cos(36° + A).(cos(36° - A) + cos(54° + A). cos(54° - A)

1) sin 2A 2) cos A
3) sin A 4) cos 2A

Q167. If $\sin 23° = \frac{a}{b}$, then the value of sec23° - sin67° is

1. $\frac{a^2}{\sqrt{b^2-a^2}}$ 2. $\frac{b^2-a^2}{ab}$

3. $\frac{a^2}{b\sqrt{b^2+a^2}}$ 4. $\frac{a^2}{b\sqrt{b^2-a^2}}$

Q168. If $\frac{\cos\beta}{\sec\alpha} = 15$ and $\frac{\sin\beta}{\sec\alpha} = 16$, then the value of $\sin^2\beta$ is

1. $\frac{256}{481}$ 2. $-\frac{256}{481}$ 3. $\frac{481}{256}$ 4. $-\frac{481}{256}$

Q169. If secΘ + tanΘ = 5, (Θ ≠ 0), then value secΘ will be equal to:

1. $\frac{1}{2}\left(5+\frac{1}{5}\right)$ 2. $\left(3+\frac{1}{3}\right)$

3. $\left(5+\frac{1}{5}\right)$ 4. $\frac{1}{2}\left(3+\frac{1}{3}\right)$

Q170. If secΘ + cosΘ = 32 then find the value of $\sec^2\Theta + \cos^2\Theta$?

1. 1000 2. 1020 3. 1022 4. 1024

Q171. If sin t + cos t = 4/5, then find the value of sin t. cos t .

1. 9/25 2. -9/25 3. -9/50 4. 9/50

Q172. If sinΘ = 4/5, then find the value of tanΘ – cotΘ?

1. 5/12 2. 7/9 3. 7/8 4. 7/12

Q173. If $\tan\frac{A}{2} = x$, then find x.

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1. $\frac{\sqrt{1+\cos A}}{\sqrt{1-\cos A}}$ 2. $\frac{\sqrt{1-\sin A}}{\sqrt{1+\cos A}}$

3. $\frac{\sqrt{1-\cos A}}{\sqrt{1+\cos A}}$ 4. $\frac{\sqrt{\cos A-1}}{\sqrt{1+\cos A}}$

Q174. The ratio of the length of each equal side and the third side of an isosceles triangle is 3 : 5. If the area of the triangle is $30\sqrt{11}$ cm², then the length of the third side (in cm) is:
1. $10\sqrt{6}$ 2. $5\sqrt{6}$ 3. $13\sqrt{6}$ 4. $11\sqrt{6}$

Q175. The value of $\left(\frac{1}{\sin\theta}+\frac{1}{\tan\theta}\right)\left(\frac{1}{\sin\theta}-\frac{1}{\tan\theta}\right)$ is:
1. 0 2. 2 3. 3 4. 1

Q176. Simplify the following:
sin 2x + 2 sin 4 x + sin 6 x
1. 4 cos² x sin 4x 2. 4 cos² x sin x
3. 2 cos² x sin 4x 4. 4 sin² x sin 4x

Q177. If $\sin A = -\frac{3}{5}$, A lies in III quadrant, the value of sec A is:
1. $-\frac{4}{5}$ 2. $-\frac{5}{4}$ 3. $-\frac{3}{4}$ 4. $\frac{3}{4}$

Q178. Find the value of the following expression.
$12(\sin^4\theta + \cos^4\theta)+18(\sin^6\theta + \cos^6\theta) + 78\sin^2\theta \cos^2\theta$
1. 30 2. 40 3. 10 4. 20

Q179. Using $\tan(A-B) = \frac{\tan A-\tan B}{1+\tan A \tan B}$, find the value of tan15°.
1. √3 + 1 2. √3 – 1
3. 2 - √3 4. 2 + √3

Q180. If P cos α = 3 and 4 tan α = Q, then what is the relation between P and Q, which is independent of α?

1. $\frac{9}{P^2}+\frac{16}{Q^2}=1$ 2. $\frac{9}{P^2}-\frac{16}{Q^2}=1$

3. $\frac{P^2}{9}-\frac{Q^2}{16}=1$ 4. $\frac{P^2}{9}+\frac{Q^2}{16}=1$

Q181. If secA + tanA = 3, then cosA is equal to:
1. $\frac{4}{3}$ 2. $\frac{3}{5}$ 3. $\frac{3}{4}$ 4. $\frac{5}{3}$

Q182. cosec 2910° + sec 4260° + tan 2565° + cot 1755° = ?
1. 3 2. 1 3. 4 4. 0

Q183. Using $\text{cosec}(\alpha+ß) = \frac{\sec\alpha \times \sec ß \times \text{cosec}\alpha \times \text{cosec} ß}{\sec\alpha \times \text{cosec} ß + \text{cosec}\alpha \times \sec ß}$, find the value of cosec75°.
1. $\frac{\sqrt{6}+\sqrt{2}}{4}$ 2. $\frac{\sqrt{6}-\sqrt{2}}{4}$ 3. $\sqrt{6}-\sqrt{2}$ 4. $\sqrt{6}+\sqrt{2}$

Q184. Find the value of tan(-1125°).
1. 1 2. ½ 3. -1 4. 0

Q185. What is the value of given expression $\frac{3\cos\alpha+2\sin\alpha}{3\cos\alpha-2\sin\alpha}$ if 3 cotA = $\frac{7}{3}$?
1. 2/3 2. 1/3 3. 13 4. 17

Q186. If 3x = secA and 3/x = tanA then $9(x^2 - 1/x^2)$ is _____
1. 3 2. 9 3. 1 4. 1/9

Q187. If $\tan^4\theta + \tan^2\theta = 1$, what is the value of $11(\cos^4\theta + \cos^2\theta)$?
1. -11 2. 8 3. 0 4. 11

Q188. Evaluate the following :
$\sqrt{2+\sqrt{2+\sqrt{2+2\cos 8\theta}}}$
1. $2\cos^2\theta$ 2. $2\cos\theta$
3. $\sin 2\theta$ 4. $\cos^2\theta$

CHSL PRE 23

Q189. If cosθ – sinθ = 0, then $(\sin^8\theta + \cos^8\theta)$ is:
1. 1/8 2. 1/6 3. 1/2 4. 1/4

Q190. If $(4\sin\theta + 5\cos\theta) = 3$, then the value of $(4\cos\theta - 5\sin\theta)$ is:
1. $4\sqrt{2}$ 2. $2\sqrt{5}$ 3. $3\sqrt{2}$ 4. $2\sqrt{3}$

Q191. The given expression is equal to: (cot B – tan B). sin B. cos B
1. $1 - 2\cos^2 B$ 2. $2\cos^2 B - 1$
3. $1 - 2\sec^2 B$ 4. $2\sec^2 B - 1$

Q192. If cosec A + cot A = 7, then cosec A is equal to:
1. 16/7 2. 25/7 3. 11/7 4. 19/7

Q193. If cosecA + cotA = $a\sqrt{b}$, then find the value of $\frac{(a^2b-1)}{a^2b+1)}$.
1. $\frac{1}{\cot A}$ 2. $\frac{1}{\sin A}$ 3. cosA 4. tanA

Q194. If sinα + cosα = 2/√3 then what is (tanα + Cotα) equal to?
1. 0 2. 2 3. 6 4. 1

Q195. If cosA + cosA = p and cotA – cosA = 1, then which of the following relation is correct?
1. $\frac{1}{4pq} = p^2 + q^2$
2. $\sqrt{\frac{1}{16pq}} = p^2 + q^2$
3. $\sqrt{16pq} = p^2 - q^2$ 4. $4pq = p^2 + q^2$

Q196. If sinθ + cosθ = 1/29, find the value of $\frac{\sin\theta+\cos\theta}{\sin\theta-\cos\theta}$.
1. 1/43 2. 43/29 3. 41/29 4. 1/41

Q197. The value of $\frac{1}{\sin\theta} - \frac{\cot^2\theta}{1+\text{cosec}\theta}$ is:
1. 0 2. 2 3. 1 4. -1

Q198. The value of $\frac{\sin 58°}{\cos 32°} + \frac{\sin 55°\sec 35°}{\tan°\tan 45°\tan 85°}$ is equal to:
1. 3 2. 1 3. 2 4. 0

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Q199. Find the value of $\frac{\cos A}{1+\sin A}+\frac{1+\sin A}{\cos A}+2$.

1. 1 + 2secA
2. 2 – secA
3. 2 + secA
4. 2(1 + secA)

Q200. If secΘ + tanΘ = 1/√3, then the positive value of cotΘ + cosΘ is:

1. √3/2 2. 2/3√3 3. 3√3/2 4. 2/√3

Q201. If tan A = ½ and tanB = 1/3, then the value of A + B is:

1. 45° 2. 60° 3. 30° 4. 15°

Q202. Simplify the given equation.

$\frac{\cot^3 A-1}{\cot A-1}=?$

1. $\text{cosec}^2A + \cot A$
2. $\text{cosec}^2A - \cot A$
3. $\cot^2A - \text{cosec}A$
4. $\cot^2A + \text{cosec}A$

Q203. If Θ is an acute angle and $\sin\Theta\cos\Theta = 2\cos^3\Theta - \frac{1}{4}\cos\Theta$, then the value of sinΘ is:

1. $\frac{\sqrt{15}-1}{4}$ 2. $\frac{\sqrt{15}-1}{2}$ 3. $\frac{\sqrt{15}+1}{4}$ 4. $\frac{\sqrt{15}-1}{8}$

SELECTION PHASE XII

Q204. Find the value of $\frac{\cos 25°-\sin 65°}{\cos 25°+\sin 65°}$.

$\frac{\cos 25°-\sin 65°}{\cos 25°+\sin 65°}$ का मान ज्ञात कीजिये?

a) 1 b) 1/2 c) -1 d) 0

Q205. If P sin60° = Q cosec45°, then the value of $\frac{P^2+Q^2}{P^2-Q^2}$ is equal to:

a) 11/7 b) 11/5 c) 5/11 d) 7/11

Q206. If $3\sec^4\Theta + 8 = 10\sec^2\Theta$, then the value of tan

a) $1, \frac{1}{\sqrt{3}}$ b) $1, \sqrt{3}$ c) $2, \frac{1}{\sqrt{3}}$ d) $2, \sqrt{3}$

Q207. The value of $\text{cosec}\Theta\left[\frac{1+\cos\theta}{\sin\theta}+\frac{\sin\theta}{1+\cos\theta}\right]-2\cot^2\Theta$ is equal to –

a) 0 b) 1 c) 2 d) 3

Q208. If A is an acute angle, what is the value of cosec A, if $\cot A = \frac{2p}{p^2-1}$?

a) $\frac{2p}{p^2+1}$ b) $\frac{p^2}{p^2-1}$ c) $\frac{p^2+1}{p^2-1}$ d) $\frac{p^2-1}{p^2+1}$

Q209. Evaluate

$7\left(\frac{\text{cosec}\,24°}{\sec 66°}\right)^3+8\left(\frac{\cot 37°}{\tan 53°}\right)^4-\left(2\frac{\sec 14°}{\text{cosec}\,76°}\right)^2+\left(-3\frac{\tan 82°}{\cot 8°}\right)^3$.

a) 40 b) 2 c) -16 d) 10

CPO 2024

Q210. If sec 6A = cosec (A – 29°), where 2A is an acute angle, then the measure of ∠A = ____°.

a) 18 b) 17 c) 21 d) 19

Q211. If tan(t) + cot(t) = 1, then one of the values of the expression $\frac{1}{\sin(t)+\cos(t)}$ is _____.

a) $\frac{1}{\sqrt{3}}$ b) $\frac{2}{\sqrt{3}}$ c) $\frac{\sqrt{3}}{2}$ d) $\sqrt{3}$

Q212. If (sin x + sin y) = a and (cos x + cos y) = b, then find the value of (sin x sin y + cos x cos y).

a) $\frac{a^2+b^2-1}{2}$ b) $\frac{a^2-b^2-2}{2}$

c) $\frac{a^2+b^2-2}{2}$ d) $\frac{a^2+b^2+2}{2}$

Q213. Find the value of (1+ cotA – cosecA) (1 + tanA + secA) - 3 ($\sin^2A + \cos^2A$).

a) -1 b) 1 c) 2 d) -2

Q214. If $\frac{(\sec A+\tan A)}{\sec A-\tan A}=2\frac{51}{79}$, then the value of sin A is equal to:

a) $\frac{77}{144}$ b) $\frac{61}{169}$ c) $\frac{87}{169}$ d) $\frac{65}{144}$

Q215 Simplify $\frac{\cos 13°+\sin 13°}{\cos 13°-\sin 13°}$.

a) cot 58° b) tan 32° c) tan 58° d) cos 26°

216. If sin x + cos x = √2 sin x, then the value of sin x – cos x is:

a) √2 sin x b) 2 sin x

c) -√2 cos x d) √2 cos x

Q217. If $4\sin^2\Theta = 3(1+\cos\Theta)$, $0° < \Theta < 90°$, what is the value of $\sqrt{15}\tan\Theta+\frac{4}{\sqrt{15}}\sin\Theta+2\sec\Theta$?

a) 24 b) 4√15 c) 8√15 d) 8

Q218. If the sides of a triangle are 7, 12 and x, and x is an integer, then find the number of possible values of x.

a) 14 b) 13 c) 15 d) 12

Q219 $\tan^4 A + \tan^2 A$ is equal to :

a) $\sec^2A - \sec^4A$ b) $-(\sec^2A + \sec^4A)$

c) $\sec^4A - \sec^2A$ d) $\sec^4A + \sec^2A$

CHSL 24

Q220. If tan A = a tan B and sin A = b sin B, then value of $\cos^2A$ is:

a) $\frac{b^2+1}{a^2+1}$ b) $\frac{b^2-1}{a^2-1}$ c) $\frac{a^2+1}{b^2+1}$ d) $\frac{a^2-1}{b^2-2}$

Q221 If sin(X – Y) = sinXcosY – cosXsinY, then $\frac{\sin(A-B)}{\cos A\cos B}+\frac{\sin(B-C)}{\cos B\cos C}$?

a) $\frac{\cos(A+C)}{\sin A\sin C}$ b) $\frac{\cos(A+C)}{\sin A\cos C}$

c) $\frac{\sin(C+A)}{\cos A\cos C}$ d) $\frac{\sin(A-C)}{\cos A\cos C}$

Q222. What is the value of $\cos^{-1}\left(\frac{7}{25}\right)-\cos^{-1}\left(\frac{15}{17}\right)$?

a) $\sin^{-1}\left(\frac{304}{425}\right)$ b) $\cot^{-1}\left(\frac{297}{425}\right)$

c) $\tan^{-1}\left(\frac{297}{425}\right)$ d) $\cos^{-1}\left(\frac{304}{425}\right)$

Q223. If tanA + sinA = x, tanA – sinA = y, what is the value of $x^2 - y^2$?

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a) $\sqrt{xy}$ b) $4\sqrt{\frac{x}{y}}$ c) $4\sqrt{xy}$ d) $2\sqrt{\frac{x}{y}}$

Q224. If tanA = √2 – 1 then find the value of sinAcosA + tanA.

a) $\frac{24\sqrt{2}-15}{4}$ b) $\frac{5\sqrt{2}+4}{4}$

c) $\frac{24\sqrt{2}+15}{4}$ d) $\frac{5\sqrt{2}-4}{4}$

Q225. If $f(p) = \sin^{p+2}x + \cos^{p+2}x$, then the value of $6f(2) - 4f(4) + 10f(0)$ is:

a) 14 b) 10 c) 12 d) 11

Q226. What is the value of $\frac{1}{\sin^4(90°-2\alpha)} + \frac{1}{\cos^2(90°-2\alpha)-1}$?

a) $sin^2 2\alpha + tan^2 2\alpha$ b) $sec^2 2\alpha\, tan^2 2\alpha$

c) $sec^2 2\alpha + cot^2 2\alpha$ d) $cos^2 2\alpha\, cot^2 2\alpha$

Q227. What is the maximum value of 7 cosA + 24 sin A + 32?

a) 57 b) 32 c) 25 d) 39

CGL 2024

Q228. If $x = p\, secA\, cosB, y = q\, secA\, sinB$ and $z = r\, tanA$, what is the value of the following expression?

$\frac{x^2}{p^2} + \frac{y^2}{q^2} - \frac{z^2}{r^2}$

a) 1 b) $p^2 + q^2 - r^2$ c) $p^2 - q^2 + r^2$ d) 0

Q229. Find the value of tan 72° - tan 27° - tan 72° tan 27°.

a) -1 b) 1 c) -2 d) 0

Q230. The value of expression $\frac{1-\sin(2t)}{1+\sin(2t)} \times \frac{\cos(t)+\sin(t)}{\cos(t)-\sin(t)}$ is:

a) $\frac{1-2\tan(t)}{1+2\tan(t)}$ b) $\frac{1-\tan(t)}{1+\tan(t)}$

c) $\frac{1+2\tan(t)}{1-2\tan(t)}$

Q231. If a $\sin^3 X$ + b $\cos^3 X$ = sinX cosX and a sinX = b cos X, then find the value of $a^2 + b^2$, provided that x is neither 0° nor 90°.

a) $a^2 + b^2$ b) $a^2 - b^2$ c) 0 d) 1

Q232. If p cos A = 2q sin A and 2p cosec A – q sec A = 3, then the value of $p^2 + 4q^2$ is:

a) 2 b) 4 c) 1 d) 3

Q233. If $\frac{1}{1-sin\theta} + \frac{1}{1+sin\theta} = 4sec\theta, (0 < \theta < 90°)$, then the value of (cotΘ + cosecΘ) is:

a) √3 b) √6 c) √2 d) √5

Q234. If $sin31° = \alpha$, then the value of cot 59° is:

a) $\frac{\sqrt{1-\alpha^2}}{2\alpha}$ b) $\frac{\alpha}{\sqrt{1-\alpha^2}}$ c) $\frac{\sqrt{1+\alpha^2}}{\alpha}$ d) $\frac{\alpha}{\sqrt{1+\alpha^2}}$

Q235. If $\frac{7sin\theta+4cos\theta}{9sin\theta-2cos\theta} = \frac{5}{4}$, then the value of $\frac{tan^2\theta+5}{tan^2\theta-5}$ is:

a) $-\frac{769}{2121}$ b) $\frac{2121}{769}$ c) $\frac{769}{2121}$ d) $-\frac{2121}{769}$

Q236. If 4tanΘ – 3 = 0, then the value of $\frac{1-cos2\theta}{1+cos2\theta}$ is:

a) 1 b) 7/15 c) 4/3 d) 9/16

Q237. If 3 sin A + 4 cos A = 5, then the value of tan A is:

a) 3/4 b) 3/5 c) 5/4 d) 4/5

Q238. Simplify:

$\frac{\sin A}{1+\cos A} + \cot A$, where A is an acute angle.

a) sinA b) cosA c) sinA + cosA d) cosec A

Q239. If sin A – cos A = $\frac{\sqrt{3}-\sqrt{2}}{2}$, then the value of sin A. cos A is:

a) $\frac{2\sqrt{3}-1}{4}$ b) $\frac{2\sqrt{2}-1}{8}$ c) $\frac{2\sqrt{6}-1}{8}$ d) $\frac{3\sqrt{2}-1}{4}$

Q240. Find the value of given expression-

$\frac{5}{1+cot^2\theta} + \frac{3}{1+tan^2\theta} + 2cos^2\theta$

a) 0 b) 5 c) 2 d) 3

Q241. If $\cot^4\phi - \cot^2\phi = 1$, then the value of $\cos^4\phi + \cos^2\phi$ is:

a) $\frac{1}{\sqrt{3}}$ b) $\frac{3}{2}$ c) 2 d) 1

Q242. If sin A + cos A = $\frac{1}{2\sqrt{2}}$, then find the value of $\sin^4 A + \cos^4 A$.

a) 7/13 b) 79/126 c) 79/128 d) 5/13

Q243. Simplify :

$\frac{1+sin\theta-cos\theta}{1+sin\theta+cos\theta}$

a) $\tan\frac{\theta}{2}$ b) $\sin\frac{\theta}{2}$ c) $\cos\frac{\theta}{2}$ d) $\cot\frac{\theta}{2}$

Answers

1	D	2	B	3	C
4	D	5	C	6	B
7	A	8	A	9	C
10	D	11	D	12	c
13	D	14	B	15	A
16	C	17	D	18	A
19	B	20	C	21	A
22	C	23	C	24	B
25	C	26	D	27	B
28	B	29	A	30	A
31	C	32	C	33	B
34	B	35	B	36	D
37	B	38	C	39	B
40	C	41	A	42	C
43	D	44	C	45	D
46	A	47	C	48	D
49	A	50	B	51	C
52	B	53	D	54	B
55	B	56	A	57	A
58	C	59	B	60	C
61	C	62	D	63	C

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64	C	65	C	66	A
67	D	68	D	69	C
70	B	71	C	72	C
73	C	74	A	75	A
76	D	77	A	78	C
79	A	80	D	81	D
82	A	83	B	84	B
85	C	86	C	87	B
88	B	89	D	90	B
91	B	92	C	93	D
94	D	95	B	96	C
97	A	98	D	99	B
100	D	101	A	102	B
103	A	104	C	105	A
106	C	107	C	108	C
109	D	110	B	111	D
112	A	113	B	114	B
115	B	116	A	117	A
118	B	119	B	120	A
121	C	122	C	123	B
124	C	125	A	126	D
127	D	128	C	129	C
130	D	131	B	132	C
133	A	134	A	135	A
136	B	137	B	138	B
139	C	140	D	141	C
142	A	143	A	144	A
145	C	146	D	147	B
148	D	149	A	150	A
151	D	152	B	153	D
154	A	155	B	156	B
157	A	158	B	159	A
160	A	161	C	162	A
163	D	164	B	165	D
166	D	167	D	168	A
169	A	170	C	171	C
172	D	173	C	174	A
175	D	176	A	177	B
178	A	179	C	180	C
181	B	182	C	183	C
184	C	185	C	186	C
187	D	188	A	189	A
190	A	191	B	192	B
193	C	194	C	195	C
196	D	197	C	198	C
199	D	200	C	201	A
202	A	203	A	204	D
205	B	206	A	207	C
208	C	209	C	210	B
211	A	212	C	213	A
214	D	215	C	216	D
217	A	218	B	219	C
220	B	221	D	222	A
223	C	224	D	225	C

226	B	227	A	228	A
229	B	230	B	231	D
232	B	233	A	234	B
235	D	236	D	237	A
238	D	239	C	240	B
241	D	242	C	243	A

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1.

$$\frac{\sec A(\sec A+\tan A)(1-\sin A)}{(\operatorname{cosec}^2 A-1)\sin^2 A}$$

$$= \frac{\sec A(1+\sin A)(1-\sin A)}{\cos A(1-\sin^2 A)} \Rightarrow \sec^2 A$$

2.

$$\sin(x+y) = \sin(90-x+y)$$

$$x+y = 90-x+y$$

$$2x = 90$$

$$x = 45^\circ$$

So $\cos^2 45^\circ = \frac{1}{2}$

3.

$$3\sin x + 4\cos x = 2$$

$$3\cos x - 4\sin x = \sqrt{3^2+4^2-2^2}$$

$$= \sqrt{21}$$

4.

$$\frac{\sin\theta\left[\tan\theta - \tan^2\theta + 1 + \tan^2\theta\right]}{(1-\sin\theta)+\tan\theta(1+\tan\theta)\frac{(1+\sin\theta)}{\cos\theta}}$$

$$= \frac{\sin\theta}{(1-\sin\theta)+\tan\theta\frac{(1+\sin\theta)}{\cos\theta}}$$

$$= \frac{\sin\theta\cdot\cos\theta}{\cos^2\theta+\tan\theta} \Rightarrow \tan^2\theta$$

5.

$$1\left(\frac{1}{\cos A}-\frac{1}{\sin A}\right)+\frac{\sin A}{1-\cos A}-\frac{1}{\sec\theta+\tan\theta}$$

$$\therefore \sec\theta - \operatorname{cosec}\theta + \operatorname{cosec}\theta + \cot\theta - \sec\theta + \tan\theta$$

$$= \tan\theta + \cot\theta$$

$$\Rightarrow \sec\theta\cdot\operatorname{cosec}\theta$$

6.

$$\sin A = \frac{4}{5} \Rightarrow \sin 3A = 3\sin A - 4\sin^3 A$$

$$= 3\times\frac{4}{5} - 4\left(\frac{4}{5}\right)^3$$

$$= \frac{44}{125}$$

7.

$$\sqrt{\frac{\operatorname{cosec}x-1}{\operatorname{cosec}x+1}} \Rightarrow \sqrt{\frac{\operatorname{cosec}^2 x-1}{(\operatorname{cosec}x+1)^2}}$$

$$= \frac{\cot x}{\operatorname{cosec}x+1} \Rightarrow \frac{\cos x}{1+\sin x} = \frac{1-\sin x}{\cos x} = \sec x - \tan x$$

8.

$$x\cos A - y\sin A = 2$$

$$x\sin A + y\cos A = 4$$

Squaring & adding both eqn

$$x^2(\cos^2 A + \sin^2 A) + y^2(\sin^2 A + \cos^2 A) - 2xy\sin A\cdot\cos A + 2xy\sin A\cdot\cos A$$

$$x^2+y^2 = 4+16 = 20$$

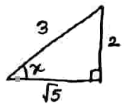
9.

$$2\sin^2 x + \sqrt{3}\cos x + 1 = 0$$

$\boxed{x = \frac{5\pi}{6}}$ satisfy the eqn

10.

$$\sin x = \frac{2}{3}$$



$$\cos 3x = 4\cos^3 x - 3\cos x$$

$$= 4\left(\frac{\sqrt{5}}{3}\right)^3 - \frac{3\sqrt{5}}{3}$$

$$= 4\left(\frac{5\sqrt{5}}{27}\right) - \sqrt{5} = -\frac{7\sqrt{5}}{27} \quad [\because \sqrt{5} = 2.23]$$

$$= -0.5797$$

11.

$$\tan A + \cot A = 6 \quad [\text{squaring}]$$

$$\tan^2 A + \cot^2 A + 2 = 36$$

$$\therefore \tan^2 A + \cot^2 A = 34$$

12.

$$117(1-\sin^2 A) + 129\sin^2 A = 120$$

$$12\sin^2 A = 3$$

$$\sin^2 A = 1/4$$

$$\operatorname{cosec}^2 A = 4$$

13.

$$\frac{\sin A}{\cos A} = \frac{\cot A}{\sin A}$$

$$\cot^2 A = \sin A$$

$$\tan^2 A = \operatorname{cosec} A$$

$$\operatorname{cosec}^3 A - \operatorname{cosec} A$$

$$\operatorname{cosec} A(\operatorname{cosec}^2 A - 1)$$

$$\tan^2 A\cdot\cot^2 A = 1$$

14.

$$\frac{1+\sin A-\cos A}{1+\sin A+\cos A} + \frac{1+\sin A+\cos A}{1+\sin A-\cos A} = ?$$

$$\frac{(1+\sin A-\cos A)^2+(1+\sin A+\cos A)^2}{(1+\sin A)^2-\cos^2 A}$$

$$= \frac{4+4\sin A}{2\sin A(1+\sin A)} = 4$$

$$= \sin A = \frac{1}{2} \quad [A = 30^\circ]$$

15.

$$\frac{\cot x}{1+\operatorname{cosec}x} + \frac{1+\operatorname{cosec}x}{\cot x}$$

$$\frac{\cos x}{1+\sin x} + \frac{1+\sin x}{\cos x}$$

$$\frac{2+2\sin x}{(1+\sin x)\cos x}$$

$$= \frac{2}{\cos x}$$

$$= 2\sec x$$

16.

$$\sqrt{6}x^2 - Kx + \sqrt{6} = 0$$

$$\frac{K}{\sqrt{6}} = \sec A + \sin A$$

$$1 = \sec A\cdot\sin A$$

$$\sin A = \cos A \quad [A = 45^\circ$$

$$\boxed{\frac{K}{\sqrt{6}} = \sqrt{2}+\frac{1}{\sqrt{2}}, \; K \to 3\sqrt{3}}$$

17.

$$\text{Put } A = \frac{\tan 20^\circ\cdot\tan 38^\circ}{\tan 79^\circ}$$

18.

$$\tan^4 x = 1 + \tan^2 x$$

$$\tan^4 x = \sec^2 x$$

$$\sin^4 x = \cos^2 x$$

$$\rightarrow \sin^4 x + \sin^2 x$$

$$\rightarrow \cos^2 x + \sin^2 x = 1$$

19.

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$8\operatorname{cosec}^2x + 25\sin^2x$

Least Value $= 2\sqrt{8\times25}$

$= 20\sqrt{2}$

20.

$$\frac{\tan60^\circ - \tan15^\circ}{1+\tan60^\circ\tan15^\circ} = \tan(60-15)$$

$= \tan45^\circ = 1$

21.

$x\cos A - y\sin A = 1$, $x\sin A + y\cos A = 4$

squaring + adding both side

$x^2+y^2 = 17$

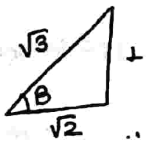
$17(x^2+y^2) = 17\times17 = 289$

22.

$\cos^2A - \sin^2A = \tan^2B$

Put $A = 30^\circ$

$\tan B = \frac{1}{\sqrt{2}}$



Put value of A & B in options and option which satisfies it. Option c satisfies the values of A & B.

23.

$$\sqrt{\frac{\operatorname{cosec}B - \cot B}{\operatorname{cosec}B + \cot B}} \times \frac{1+\cos B}{\sin B}$$

$$\sqrt{\frac{1-\cos B}{1+\cos B}} \times \frac{1+\cos B}{\sin B} \times \sqrt{\frac{1-\cos B}{1-\cos B}}$$

$$\frac{1-\cos B}{\sin B} \times \frac{1+\cos B}{\sin B} = 1$$

24.

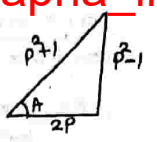
$(\tan^2 29^\circ - \sec^2 29^\circ) + \cot^2 54^\circ - \operatorname{cosec}^2 54^\circ + [\sin^2 1^\circ + \ldots\ldots + \sin^2 89^\circ]$

$\Rightarrow -1 - 1 + 22\frac{1}{2} = 20\frac{1}{2}$

25.

$\sec A + \tan A = p$

$\sec A - \tan A = \frac{1}{p}$



$$\sec A = \frac{\left(p+\frac{1}{p}\right)}{2} = \frac{p^2+1}{2p}$$

$$\frac{\operatorname{cosec}A+1}{\operatorname{cosec}A-1} = \frac{\frac{p^2+1}{p^2-1}+1}{\frac{p^2+1}{p^2-1}-1} = \frac{2p^2}{2} = p^2$$

26.

$$(1+\cot x - \operatorname{cosec}x)(1+\cos x+\sin x)\sec x$$

$$\frac{(\sin x+\cos x-1)(\sin x+\cos x+1)\sec x}{\sin x}$$

$$= \frac{(1+2\sin x\cos x-1)\sec A}{\sin x}$$

$= 2$

27.

$$\frac{C}{1+\sin x} = \frac{2\sin x}{1+\sin x+\cos x}\cdot\frac{(1+\sin x-\cos x)}{(1+\sin x-\cos x)}$$

$$= \frac{2\sin x(1+\sin x-\cos x)}{(1+\sin x)^2-\cos^2 x}$$

$$= \frac{2\sin x(1+\sin x-\cos x)}{2\sin x+2\sin^2 x}$$

$$\frac{C}{1+\sin x} = \frac{1+\sin x-\cos x}{1+\sin x}$$

28.

$$\frac{\cos x}{\sin x+\cos y} + \frac{\cos y}{\sin y-\cos x} = \frac{A}{\sin x+\cos y} + \frac{\cos y}{\sin y+\cos x}$$

Put $y=0$ [2 variable and 1 eqn so we can take one variable $=0$]

$$\frac{\cos x}{\sin x} = \frac{A}{\sin x}$$

$\boxed{A = \cos x}$

29.

$$\frac{2\sin(1+\sin)}{1+\sin+\cos} \times \frac{1+\sin-\cos}{1+\sin-\cos}$$

$$\frac{2\sin(1+\sin)(1+\sin-\cos)}{2\sin A+2\sin^2 A}$$

$= 1+\sin A-\cos A$

30.

$$\sqrt{\frac{\cot A+\cos A}{\cot A-\cos A}}$$

$$= \sqrt{\frac{1+\sin A}{1-\sin A}\times\frac{1+\sin A}{1+\sin A}}$$

$$= \frac{1+\sin A}{\cos A}$$

$= \sec A + \tan A$

31.

Put $\rho = 45^\circ$

$$= \frac{\frac{\sqrt2(\sqrt2-1)}{\sqrt2}\cdot\frac{\sqrt2(\sqrt2+1)}{\sqrt2}}{\frac{1}{\sqrt2}\times4}$$

$= \frac{1}{2}$

Now put $\rho = 45^\circ$ in options

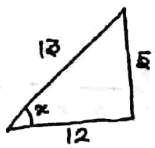
option (c) $\sin\rho\cdot\cos\rho = \frac{1}{\sqrt2}\cdot\frac{1}{\sqrt2}$

$= \frac{1}{2}$ (Satisfies)

32.

$5\cos x = 12\sin x$

$\tan x = \frac{5}{12}$



$$= \frac{2\sin x+\cos x}{\cos x-\sin x}$$

$$= \frac{2\times\frac{5}{13}+\frac{12}{13}}{\frac{12}{13}-\frac{5}{13}} = \frac{22}{7} \text{ or } 3\frac{1}{7}$$

33.

$5\cos x - 12\sin x = 0$

$5\cos x = 12\sin x$

$\tan x = \frac{5}{12}$

$\frac{p}{b} \Rightarrow h \Rightarrow 13$

$$\Rightarrow \frac{2\times\frac{5}{13}+\frac{12}{13}}{\frac{12}{13}-\frac{5}{13}}$$

$\Rightarrow \frac{22}{7} \Rightarrow 3\frac{1}{7}$

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$$\frac{\sin^3\theta_1+\cos^3\theta_1+\sin^2\theta_2+\cos^2\theta_1}{\sin\theta_1+\cos\theta_1}+\frac{1}{\sec\theta_2\cdot\operatorname{cosec}\theta_1}$$

$$\downarrow$$

$$\sin^2\theta_1+\cos^2\theta_1-\sin\theta_1\cdot\cos\theta_1+\sin^2\theta_2+\cos^2\theta_1+\sin\theta_1\cdot\cos\theta_1$$

$$\Rightarrow 2$$

35.

$$\cos\theta_1+\cos\theta_2+\cos\theta_3+\dots\dots+\cos\theta_{20}=20$$

At 0° $\cos\theta_1=\cos 0^\circ=1$

So $\theta_1+\theta_2+\theta_3+\dots\dots+\theta_{20}=0$

36.

$$\frac{\sec A+\tan A}{\underbrace{\sec^2A-\tan^2A}_{1}}-\sec A=\sec A\times K$$

$$=\frac{\tan A}{\sec A}=K\Rightarrow \sin A$$

37.

$$\left(\frac{1}{1+\operatorname{cosec}A}-\frac{1}{1-\operatorname{cosec}A}\right)\cos x=2$$

$$\frac{1-\operatorname{cosec}-1-\operatorname{cosec}x}{-\cot^2x}\cdot\cos x=2$$

$$=\frac{-2\operatorname{cosec}x\cdot\cos x}{-\cot^2x}=2$$

$$\Rightarrow \tan x=1$$

$$x=45^\circ$$

$$\sin^2x+\cot^2x+\sec^2x=\frac{1}{2}+\frac{1}{1}+2=3\frac{1}{2}$$

38.

$$\frac{\sec x(1-\sin x)(1+\sin x)}{\cos x\,(1-\sin x)^2}=\frac{1+k}{1-k}$$

$$\frac{\cos^2x}{}$$

$$\frac{1+\sin x}{1-\sin x}=\frac{1+k}{1-k}$$

$$K=\sin x$$

39.

$$\sec A=3x,\ \tan A=\frac{3}{x}$$

$$\sec^2A-\tan^2A=9\left(x^2-\frac{1}{x^2}\right)$$

$$1=9\left(x^2-\frac{1}{x^2}\right)$$

40.

$$\frac{\tan x-\sec x+1}{\tan x+\sec x-1}\cdot\sec A=\frac{1}{K}$$

$$K=\frac{\tan x+\sec x-1}{\tan x-\sec x+1}\times\frac{1}{\sec A}$$

$$=\frac{\tan A+\sec A-(\sec^2x-\tan^2x)}{\tan x-\sec x+1}\cdot\frac{1}{\sec x}$$

$$=\frac{(\sec x+\tan x)(1-\sec x+\tan x)}{(\tan x-\sec x+1)}\cdot\frac{1}{\sec A}$$

$$K=\frac{1+\sin x}{\cos x\cdot\sec x}\Rightarrow 1+\sin x$$

41.

$$\frac{\tan A}{1-\cot A}+\frac{\cot A}{1-\tan A}=1+K$$

L.H.S. $\dfrac{\sin^2A}{\cos A(\sin A-\cos A)}+\dfrac{\cos^2A}{\sin A(\cos A-\sin A)}$

$$\frac{\sin^2A}{\cos A(\sin A-\cos A)}-\frac{\cos^2A}{\sin A(\sin A-\cos A)}$$

$$\frac{1}{(\sin A-\cos A)}\cdot\frac{(\sin^3A-\cos^3A)}{\sin A\cdot\cos A}\Rightarrow\frac{1+\sin A\cos A}{\sin A\cos A}$$

$$=1+\sec A\cdot\operatorname{cosec}A$$

$$=K=\sec A\operatorname{cosec}A$$

42.

$$\cos^2x-\sin^2x-3\cos x+2=0$$

$$\cos^2x-(1-\cos^2x)-3\cos x+2=0$$

$$2\cos^2x-3\cos x+1=0$$

$$2\cos^2x-2\cos x-\cos x+1=0$$

$$\cos x=1,\ \frac{1}{2}$$

As per condition $\cos x=\frac{1}{2}\Rightarrow x=60^\circ$

$$4\times\frac{2}{\sqrt3}+\frac{1}{\sqrt3}=\frac{9}{\sqrt3}=3\sqrt3$$

43.

$$\frac{(\sec y+\tan y)(1-\sin y)}{\operatorname{cosec}y\,(1+\cos y)(\operatorname{cosec}y-\cot y)}$$

$$\frac{(1+\sin y)(1-\sin y)\sin y}{\operatorname{cosec}y\,(1+\cos y)(1-\cos y)}$$

$$\frac{\cos^2y\cdot\sin y}{\operatorname{cosec}y\cdot\sin^2y}$$

$$=\cos^2y$$

44.

$$\sqrt{\frac{1-\cos A}{1+\cos A}}\times\sqrt{\frac{1-\cos A}{1+\cos A}}=\frac{1-y}{1+y}$$

$$\frac{1-\cos A}{1+\cos A}=\frac{1-y}{1+y}\Rightarrow y=\cos A$$

45.

Put $45^\circ=A$

$$\left(\sqrt2-\frac{1}{\sqrt2}\right)^2+\left(\sqrt2-\frac{1}{\sqrt2}\right)^2-(1-1)^2$$

$$=1$$

46.

$$\sqrt{\sec^2x+\operatorname{cosec}^2x}\cdot\sqrt{\tan^2x-\sin^2x}$$

$$\sqrt{\frac{1}{\cos^2x}+\frac{1}{\sin^2x}}\cdot\frac{\sin x\cdot\sin x}{\cos x}$$

$$=\frac{1}{\sin x\cos x}\cdot\frac{\sin^2x}{\cos x}\rightarrow\sin x\cdot\sec^2x$$

47.

Put $y=45^\circ$

$$\frac{\frac{1}{\sqrt2}-\frac{1}{\sqrt2}+1}{\frac{1}{\sqrt2}+\frac{1}{\sqrt2}-1}=\frac{1}{\sqrt2-1}=\sqrt2+1$$

Put $y=45^\circ$ in options.

opt. (c) $\sec y+\tan y=\sqrt2+1$ (Satisfied)

48.

$$(1+\tan^2x)+\left(\frac{1+\tan^2x}{\tan^2x}\right)=K$$

$$\frac{(1+\tan^2x)(1+\tan^2x)}{\tan^2x}=K$$

$$\frac{\sec^4x}{\tan^2x}=K$$

$$\sec^2x\cdot\operatorname{cosec}^2x=K$$

$$\sqrt K=\sec x\cdot\operatorname{cosec}x$$

49.

$$\frac{1}{\sec x-\tan x}-\frac{1}{\cos x}$$

$$\sec x+\tan x-\sec x$$

$$=\tan x$$

50.

$$\frac{\sin^2A}{\cos^2A}\left(\frac{1-2\sin^2A}{2\cos^2A-1}\right)+1$$

$$\tan^2A\cdot\frac{\cos 2A}{\cos 2A}+1$$

$$=\sec^2A$$

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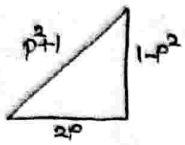
$\sec x + \tan x = p$

$\sec x - \tan x = \frac{1}{p}$

$\sec x = \frac{p^2+1}{2p}$

$\operatorname{cosec} x = \frac{1+p^2}{1-p^2}$



52.

$\frac{\cos^2\theta}{\cot^2\theta + \sin^2\theta - 1} = 3$, Put $\theta = 60^\circ$

LHS = RHS

$\tan\theta + \cos\operatorname{ec}\theta$

$\sqrt{3} + \frac{2}{\sqrt{3}} = \frac{5\sqrt{3}}{3}$

53.

$1 + 2\tan\theta + 2\sin\theta\sec^2\theta$, Put $\theta = 30^\circ$

$= 3$

Put $\theta = 30^\circ$ in options

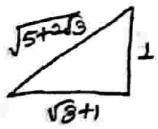
option (d) $\frac{1+\sin\theta}{1-\sin\theta} = \frac{1+\frac{1}{2}}{1-\frac{1}{2}} = 3$

54.

$\cos\theta - \sin\theta = \sqrt{3}\sin\theta$

$\frac{\cos\theta}{\sin\theta} = \sqrt{3}+1$

$\cot\theta = \sqrt{3}+1$



$\tan\theta - \cot\theta = \frac{1}{\sqrt{3}+1} - \sqrt{3}+1$

$= \frac{1-(\sqrt{3}+1)^2}{\sqrt{3}+1}$

$= \frac{-(3+2\sqrt{3})}{\sqrt{3}+1}$

55.

$\sin^2(2x+10) = \frac{3}{4}$

$x = 35^\circ$

$\frac{\sin^4(35-5)^\circ + \cos^4(35-5)^\circ}{1 - 2\sin^2(3\times35-15)\cos^2(3\times35+15)}$

$= \frac{\frac{1}{16} + \frac{9}{16}}{1-0} = \frac{10}{16} = \frac{5}{8}$

56.

$\sin^6\theta + \cos^6\theta = \frac{1}{2}$

$1 - 3\sin^2\theta\cos^2\theta = \frac{1}{2}$

$\sin^2\theta \cdot \cos^2\theta = \frac{1}{6}$

$\sin\theta \cdot \cos\theta = \frac{\sqrt{6}}{6}$

57.

$\frac{\tan^2 30}{\sec^2 30^\circ} + \frac{\operatorname{cosec}^2 45^\circ}{\cot^2 45^\circ} - \frac{\sec^2 60^\circ}{\operatorname{cosec}^2 60}$

$\frac{1/3}{4/3} + \frac{2}{1} - \frac{4}{4/3}$

$= \frac{1}{4} + 2 - 3 \longrightarrow -3/4$

58.

$\sqrt{\frac{\sec^2\theta + \operatorname{cosec}^2\theta}{\tan^2\theta - \sin^2\theta}} \Rightarrow \frac{1}{\frac{\sin\theta\cdot\cos\theta}{\sin\theta\cdot\frac{\sin\theta}{\cos\theta}}}$

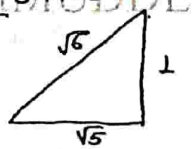
$= \frac{1}{\sin^3\theta} \Rightarrow \operatorname{cosec}^3\theta$

59.

$\sin^2\theta = 5\tan^2\theta - 5\sin^2\theta$

$6\sin^2\theta = 5\tan^2\theta$

$\cos\theta = \sqrt{\frac{5}{6}}$



$\frac{24\sin^2\theta - 15\sec^2\theta}{6\operatorname{cosec}^2\theta - 7\cot^2\theta}$

$= \frac{24\times\frac{1}{6} - 15\times\frac{6}{5}}{6\times6 - 7\times5}$

$= -14$

60.

$\sin\alpha + \sin\beta = \cos\alpha + \cos\beta$

$\alpha = 0,\ \beta = 90$

$\beta = 0,\ \alpha = 90$ } either one conditions is true

So, $\sin\alpha + \cos\alpha = 1$

61.

$\sec^2\alpha\left[\frac{\operatorname{cosec}\alpha + 1}{\operatorname{cosec}\alpha}\right]\left[\frac{\operatorname{cosec}\alpha - 1}{\operatorname{cosec}\alpha}\right]$

$\sec^2\alpha\left[\frac{\operatorname{cosec}^2\alpha - 1}{\operatorname{cosec}^2\alpha}\right]$

$\tan^2\alpha \cdot \left[-\cot^2\alpha\right] = -1$

62.

$\frac{4\times\frac{1}{2} + 4}{\sqrt{32} - 4} = \frac{6}{2\sqrt{3}-4}$

$= \frac{3}{\sqrt{3}-2} \Rightarrow -3(\sqrt{3}+2)$

63.

$\sin^2\theta - 2\sin\theta + 1 = 0$

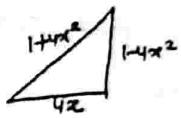
$(\sin\theta - 1)^2 = 0$

$\theta = 90^\circ$

$\frac{1+\operatorname{cosec}\theta}{1-\cos\theta} = \frac{1+1}{1-0} = 2$

64.

$\cos\theta = \frac{4x}{1+4x^2}$



$\sin\theta = \frac{1-4x^2}{1+4x^2}$

65.

$\frac{\cos 8^\circ \cdot \cos 24^\circ \cdot \cos 60^\circ \cdot \cos 66 \cdot \cos 82}{\sin 82^\circ \sin 66^\circ \sin 60^\circ \cdot \sin 8^\circ \sin 24^\circ}$

$\frac{\cos 60}{\sin 60} \Rightarrow \frac{1/2}{\sqrt{3}/2} \Rightarrow 1/\sqrt{3}$

66.

$\frac{3[\cot^2 46 - \operatorname{cosec}^2 46] + 2\cos^2\theta \cdot \tan 3\theta \cdot \tan 3\theta}{2[\sin^2 2\theta + \sin^2 62]} \quad \operatorname{cosec}\theta - \cot^2\theta$

$\Rightarrow \frac{3(-1)}{2} + \frac{2\times\frac{1}{4}}{1} \Rightarrow -\frac{3}{2} + \frac{1}{2} = -1$

67.

$2\cot\theta = \sqrt{3}\operatorname{cosec}\theta$

$\cos\theta = \frac{\sqrt{3}}{2} \Rightarrow \theta = 30^\circ$

$\frac{\frac{7}{2}\times2 - \frac{3}{4}\times4}{4\times\frac{1}{4} + \frac{3}{2}\times\frac{1}{3}} \Rightarrow \frac{\frac{11}{2} - 3}{3/2}$

$= \frac{5}{3} \Rightarrow 5$

68.

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$\cot^2 46° - \sec^2 44° + [\sin^2 1° + \dots + \sin^2 90°]$

$22\frac{1}{2}$

$\cot^2 46° - \operatorname{cosec}^2 46° + 22\frac{1}{2}$

$= -1 + 22.5 \rightarrow 21.5$

69.

$1+\cot^2\theta + \frac{1+\cot^2\theta}{\cot^2\theta} = K$

$\frac{(1+\cot^2\theta)^2}{\cot^2\theta} = K$

$\frac{\operatorname{cosec}^4\theta}{\cot^2\theta} = k$

$\sqrt{K} = \operatorname{cosec}\theta \cdot \sec\theta$

70.

$3\sin^2 A + 4\cos^2 A - 3 = 0$

$\cos^2 A = 0$

$A = 90°$

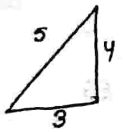
$\cot A = \cot 90° = 0$

71.

$\cot A + \operatorname{cosec} A = 2$

$\operatorname{cosec} A - \cot A = 1/2$

$\operatorname{cosec} A = 5/4$



$\frac{9\tan A + 16\operatorname{cosec} A}{5\sin A + 3\tan A} = \frac{8\times\frac{4}{3} + 16\times 5/4}{5\times\frac{4}{5} + 8\times\frac{4}{3}}$

$= 3$

72.

$\cot^2\theta + \cot^4\theta = 2$

i.e. $\theta = 45°$

$2\sin^4\theta + \sin^2\theta = 2\times\frac{1}{2}\times\frac{1}{2} + \frac{1}{2}$

$= 1$

73.

$\sin\alpha + \cos\alpha = \tan\frac{\pi}{3} = \sqrt{3}$

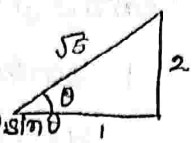
$\sin^3\alpha + \cos^3\alpha$

$= (\sin\alpha + \cos\alpha)^3 - 3\sin\alpha\cos\alpha(\sin\alpha + \cos\alpha)$

$= (\sqrt{3})^3 - 3\sqrt{3} = 0$

74.

$\operatorname{cosec}\theta = \frac{\sqrt{5}}{2}$



$\sec\theta + \tan\theta - \cot\theta\sin\theta$

$\sqrt{5} + 2 - \frac{1}{2}\times\frac{2}{\sqrt{5}}$

$= \frac{4\sqrt{5}}{5} + 2$

75.

$8\sin^2\theta + 2\cos\theta = 5$

$8(1-\cos^2\theta) + 2\cos\theta = 5$

$8\cos^2\theta - 2\cos\theta - 3 = 0$

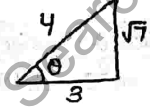
$8\cos^2\theta - 6\cos\theta + 4\cos\theta - 3 = 0$

$2\cos\theta(2\cos\theta - 3) + 1(4\cos\theta - 3) = 0$

$\cos\theta = 3/4, -1/2$

θ = positive $[0 < \theta < 90°]$

$\frac{7}{9} + \frac{16}{9} - \frac{7}{16}$



$= \frac{305}{144}$

76.

$3\cot^2 x - 7\operatorname{cosec}^2 x + 7 = 0$

$3(\cot^2 x - \operatorname{cosec}^2 x) - 4\operatorname{cosec}^2 x + 7 = 0$

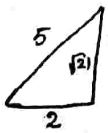
$4 = 4\operatorname{cosec}^2 x$

$x = 90°$

77.

$5(1-\cos^2\theta) = 3 + 3\cos\theta$

$5\cos^2\theta + 3\cos\theta - 2 = 0$



$5\cos^2\theta + 5\cos\theta - 2\cos\theta - 2 = 0$

$5\cos\theta(\cos\theta + 1) - 2(\cos\theta + 1) = 0$

$\cos\theta = -1, 2/5 \quad (\theta > 0°)$

$\operatorname{cosec}\theta + \cot\theta = \sqrt{\frac{7}{3}}$

78.

$\frac{\operatorname{cosec}\theta + \cot\theta}{\operatorname{cosec}\theta - \cot\theta} = 7$

$8\cot\theta = 6\operatorname{cosec}\theta$

$\cos\theta = 3/4$

$\frac{48\sin^2\theta + 5}{48\sin^2\theta - 1} = \frac{4\times\frac{7}{16} + 5}{4\times\frac{7}{16} - 1} = 9$

79.

$y = \tan 85°, \quad \cot 85° = \frac{1}{y}$

$9\tan 55° + \cot 55°$

$9\cot 85 + \tan 85$

$\frac{9}{y} + y = \frac{9+y^2}{y}$

80.

$\tan\theta + \cot\theta = 4$

$\tan^2\theta + \cot^2\theta = 14$ — (A)

and

$\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta} = 4$

या $\operatorname{cosec}\theta \cdot \sec\theta = 4$ — (B)

Put values from eqn (A) & (B)

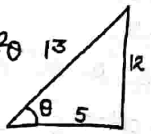
$3(14) = 2\times 16 - 4$

$3:2$

81.

$8\sin\theta = 12/13$

$= \frac{\sin^2\theta - \cos^2\theta}{8\cos\theta\cdot\sin\theta}\times\cot^2\theta$



$= \frac{\frac{144-25}{169}}{\frac{2\times 12\times 5}{169}} \times \frac{125}{144}$

$= \frac{595}{3456}$

82.

$\frac{(1+\cos\theta)(\operatorname{cosec}\theta - \cot\theta)\sec\theta}{\sin\theta(1-\sin\theta)(\sec\theta + \tan\theta)}$

$\frac{(1+\cos\theta)\frac{(1-\cos\theta)}{\sin\theta}\times\frac{1}{\cos\theta}}{\sin\theta(1-\sin\theta)\frac{(1+\sin\theta)}{\cos\theta}}$

$= \frac{\sin\theta}{\sin\theta\cdot\cos^2\theta} \Rightarrow \sec^2\theta$

83.

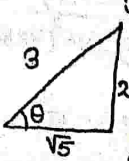
$3\cos^2\theta - 4\sin\theta + 1 = 0$

$3(1-\sin^2\theta) - 4\sin\theta + 1 = 0$

$3\sin^2\theta + 4\sin\theta - 4 = 0$

$\sin\theta = 2/3, -2$ ✗

$[0 < \theta < 90°]$



$3\cos^2\theta + 5\tan^2\theta$

$3\times 5/9 + 5\times\frac{4}{5}$

$= 5\frac{2}{3}$

84.

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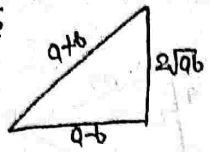
$\sin\theta = \frac{2\sqrt{ab}}{a+b}$



$\frac{\cos\theta+1}{\cos\theta-1}$

$= \frac{\frac{a-b}{a+b}+1}{\frac{a-b}{a+b}-1} \Rightarrow \frac{-2a}{2b} = -\frac{a}{b}$

85.

$\frac{3\cos^2 27 - 5 + 3\cos^2 63}{\tan^2 32 + 4 - \text{cosec}^2 58^\circ}$

$+ \sin 35\cos 55 + \cos 35 \cdot \sin 55$

$\Rightarrow \frac{3-5}{-1+4} + \sin^2 35 + \cos^2 35$

$\Rightarrow \frac{-2}{3} + 1 \Rightarrow \frac{1}{3}$

86.

Put $\theta = 0^\circ$

$\frac{\tan^2 22 - \tan 68 - \text{cosec}^2 68 + \cot 22}{3(\cot^2 52 - \text{cosec}^2 52) + 2(\text{cosec}^2 28 - \cot^2 28)}$

$\Rightarrow \frac{\tan^2 22 - \sec^2 22}{-3+2} = 1$

87.

$\cos^2\theta - (1-\cos^2\theta) - 3\cos\theta + 2 = 0$

$2\cos^2\theta - 3\cos\theta + 1 = 0$

$\cos\theta = \frac{1}{2}, 1$

As per condition of θ, $\cos\theta = \frac{1}{2}$

$\theta = 60^\circ$

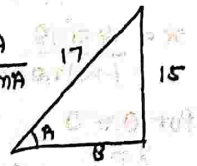
$5\cos\theta - \frac{\tan\theta}{2} = 5\times\frac{1}{2} - \frac{\sqrt{3}}{2}$

$= \frac{5-\sqrt{3}}{2}$

88.

$\sec A = 17/8$

$\frac{34\sin A + 15\cot A}{68\cos A - 16\tan A}$



$= \frac{34\times\frac{15}{17} + 15\times\frac{8}{15}}{68\times\frac{8}{17} - 16\times\frac{15}{8}} = 19$

89.

$1 + \sqrt{\frac{\cot\theta+\cos\theta}{\cot\theta-\cos\theta}}$

$1 + \sqrt{\frac{1+\sin\theta}{1-\sin\theta}\cdot\frac{1+\sin\theta}{1+\sin\theta}}$

$1 + \frac{1+\sin\theta}{\cos\theta}$

$1 + \sec\theta + \tan\theta$

90.

$\tan^2 A + 5\sec A = 13$

Put $A = 60^\circ$ (satisfies)

91.

$5\sin\theta - 4\cos\theta = 0$

$\frac{\sin\theta}{\cos\theta} = \frac{4}{5}$

$\frac{5\sin\theta - \cos\theta}{5\sin\theta + 3\cos\theta} = \frac{5\times4-5}{5\times4+3\times5} = \frac{15}{35}$

92.

$2 - \sqrt{\frac{\cot\theta+\cos\theta}{\cot\theta-\cos\theta}}$

$2 - \sqrt{\frac{1+\sin\theta}{1-\sin\theta}}$

$2 - \sqrt{\frac{1+\sin\theta}{1-\sin\theta}\times\frac{1+\sin\theta}{1+\sin\theta}}$

$2 - \frac{(1+\sin\theta)}{\cos\theta} \Rightarrow 2\sec\theta - \tan\theta$

93.

$3\sin^2\theta + 4\cos\theta - 4 = 0$

$3(1-\cos^2\theta) + 4\cos\theta - 4 = 0$

$\cos\theta = \frac{1}{3}\ [0<\theta<90]$

$\cot^2\theta + \text{cosec}^2\theta \Rightarrow \frac{8}{9} + \frac{9}{9} \Rightarrow \frac{5}{4}$

94.

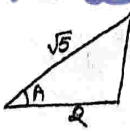
$6\tan^2 A + 6\tan A - 5 + \tan^3 A = 0$

$6\tan^2 A + 7\tan A - 5 = 0$

$6\tan^2 A + 10\tan A - 3\tan A - 5 = 0$

$\tan A = 1, -5/3$

$[0 < A < \pi/2]$



$\tan A = 1/2$

$\sin A + \cos A$

$\frac{2}{\sqrt{5}} + \frac{1}{\sqrt{5}} = \frac{3}{\sqrt{5}}$

95.

$\sin^2\phi - 3\sin\phi + 2 = \cos^2\phi$

$= 1 - \sin^2\phi$

$2\sin^2\phi - 3\sin\phi + 1 = 0$

$\sin\phi = \frac{1}{2}, \phi = 30^\circ$

$\cos 60^\circ - \sin 90^\circ + \sec 60^\circ$

$\frac{1}{2} - 1 + \frac{2}{\sqrt{3}}$

$-\frac{1}{2} + \frac{2}{\sqrt{3}} \Rightarrow \frac{-\sqrt{3}+4}{2\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

$= \frac{4\sqrt{3}-3}{6}$

96.

$\frac{(1+\sec\theta\,\text{cosec}\theta)^2(\sec\theta-\tan\theta)^2(1+\sin\theta)}{(\sin\theta+\sec\theta)^2(\cos\theta+\text{cosec}\theta)^2}$

$\frac{\left(\frac{\sin\theta\cos\theta+1}{\sin^2\theta\cdot\cos^2\theta}\right)^2 \times \frac{(1-\sin\theta)^2}{\cos^2\theta} \times (\sin\theta+1)}{\left(\frac{\sin\theta\cdot\cos\theta+1}{\cos^2\theta}\right)^2 + \frac{\sin\theta\cdot\cos\theta+1}{\sin^2\theta}}$

$\frac{(1-\sin\theta)^2(1+\sin\theta)}{\cos^2\theta\,\sin^2\theta\cdot\cos^2\theta} \Big/ \frac{1}{\sin^2\theta\cos^2\theta}$

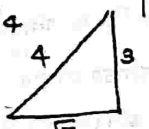
$= \frac{\cos^2\theta(1-\sin\theta)}{\cos^2\theta} = 1-\sin\theta$

97.

$\frac{\sec\theta - \tan\theta}{\sec\theta + \tan\theta} = \frac{1}{7}$

$6\sec\theta = 8\tan\theta$

$\sin\theta = 3/4$



$\frac{\text{cosec}\theta + \cot^2\theta}{\text{cosec}\theta - \cot^2\theta}$

$= \frac{\frac{4}{3}+\frac{7}{9}}{\frac{4}{3}-\frac{7}{9}} = 19/5$

98.

$\frac{(\tan^2\theta - \sec^2\theta)^3}{(\tan\theta+\cot\theta)^2} = \frac{(-1)^3}{\frac{1}{\sin^2\theta\cdot\cos^2\theta}}$

$-\sin^2\theta\cdot\cos^2\theta$

[OR Put $\theta = 45^\circ$ and satisfies]

99.

$\frac{\cos^2\theta - \sin^2\theta + 2\sin^2\theta + 3}{(\cos\theta\sec\theta+1)^2 - \cot^2\theta - 2}$

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$$\frac{4}{1+2\cos ec\theta+1-2} = 2\sin\theta$$

100.

Put $\theta = 45^\circ$

$$\frac{(\sqrt{2}-1)\,2\sqrt{2}\times 2}{\sqrt{2}(\sqrt{2}-1)\times 2} = 2$$

(option (D) satisfies)

101.

$\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 15^\circ + \dots + \sin^2 90^\circ$

$\sin^2 85 = \sin^2(90-5) = \cos^2 5$

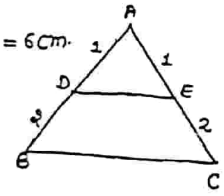
$\sin^2 5 + \cos^2 5 = 1$, $\sin^2 45^\circ = \left(\frac{1}{\sqrt{2}}\right)^2 = \frac{1}{2}$

$8 + \frac{1}{2} + 1 = 9\frac{1}{2}$

102.

$DE = \frac{1}{3}BC$

$DE = \frac{1}{3}\times 18 = 6\text{cm}$.



103.

$\sin A \sin(60-A)\sin(60+A) = \frac{1}{4}\sin 3A$

$= \sin 10 \sin 50 \sin 70 \sin 60$

$= \sin 10^\circ \sin(60-10)\sin(60+10)\cdot\sin 60^\circ$

$= \frac{1}{4}\sin 3\times 10 \cdot \sin 60^\circ$

$= \frac{1}{4}\times\frac{1}{2}\times\frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{16}$

104.

$m(k^2-1)$

$\sec\theta + \operatorname{cosec}\theta\left[\sin^2\theta+\cos^2\theta+2\sin\theta\cos\theta-1\right]$

$\frac{1}{\cos\theta}+\frac{1}{\sin\theta}\left(1+2\sin\theta\cos\theta-1\right)$

$\frac{\sin\theta+\cos\theta}{\sin\theta\cos\theta}\times 2\sin\theta\cos\theta$

$2(\sin\theta+\cos\theta) = 2k$

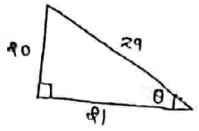
105.

$\operatorname{cosec}\theta + \cot\theta = 2/5$

$\operatorname{cosec}\theta - \cot\theta = 5/2$

$\operatorname{cosec}\theta = 29/10\times 2$

$\sin\theta = 20/29$



106.

by using these identities —

$\cos(A+B)+\cos(A-B) = 2\cos A\cos B$

$\cos(A+B)-\cos(A-B) = -2\sin A\sin B$

applying in given question –

$$\frac{\cos 5\theta+\cos\theta-\cos 9\theta-\cos 5\theta+\cos 11\theta+\cos 9\theta}{\cos\theta-\cos 7\theta+\cos 7\theta-\cos 3\theta+\cos 3\theta-\cos 11\theta}$$

$$\frac{\cos\theta+\cos 11\theta}{\cos\theta-\cos 11\theta} = \frac{2\cos 6\theta\cdot\cos 5\theta}{-2\sin 6\theta\cdot\sin 5\theta}$$

107.

$$\frac{\tan+\sec-1}{\tan-\sec+1}\times\frac{\tan+\sec}{\tan+\sec}$$

$$\frac{(\tan+\sec-1)(\tan+\sec)}{\tan^2-\sec^2+\tan+\sec}$$

$$= \frac{(\tan+\sec-1)(\tan+\sec)}{\tan+\sec-1}$$

$$= \tan+\sec = \frac{1+\sin}{\cos}$$

108.

Let all cos term $= 1$

$\frac{1}{a} = \frac{1}{b} = \frac{1}{c} = k$

$a = k$; $b = k$, $c = k$

$\left(\frac{a+c}{b}\right)^2+\left(\frac{a-c}{b}\right)^2$

$= \left(\frac{2k}{k}\right)^2+(0)^2 = 4$

109.

Put $\theta = 45^\circ$

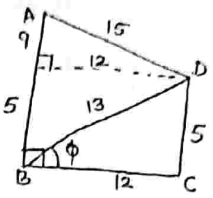
$\left(\frac{1}{\sqrt{2}}+\sqrt{2}\right)^2+\left(\frac{1}{\sqrt{2}}+\sqrt{2}\right)^2-1$

$= \frac{9}{2}+\frac{9}{2}-1 = 8$

option – 4. [6+1+1 = 8]

Satisfies

110.



$\frac{\sin\phi+\tan\phi}{\sin\phi-\tan\phi} = \frac{\frac{5}{13}+\frac{12}{9}}{\frac{5}{13}-\frac{12}{9}} = \frac{267}{39}$

111.

$\sin A+\cos A = \sqrt{7}$

squaring both side

$1+2\sin A\cos A = 7$

$\sin A\cos A = 3$

So: $\tan A+\cot A$

$= \frac{5}{4}+\frac{5}{3}$

$= \frac{1}{2\text{sc}} = \frac{1}{6}$

112.

$x = \sin 130^\circ\cdot\cos 80^\circ$

2nd quad (+ve) 1st Quad (+ve) [overall +ve]

$y = \sin 80^\circ \cos 130^\circ$ [overall −ve]

(+) (−)

$z = 1+xy$

$= 1+(+\cdot-)$

$= 1-\text{ve}$

$= \text{less than } 1$

$\therefore x>0$

$y>0$, and $z<1$

113.

$$\frac{\sec\cdot\sin(1-2\sin^2\cdot)}{\cos(2\cos^2-1)}$$

$$= \frac{\sec\cdot\tan(\cos 2\theta)}{\cos 2\theta}$$

$= \sec\cdot\tan$

114.

$x = \frac{2\sin\theta}{1+\sin\theta+\cos\theta}$

Put $\theta = 0$

$x = 0$

$\frac{1-1+0}{1+0} = 0$

$= \frac{1-\cos\theta+\sin\theta}{1+\sin\theta} = 0$

$x = 0$ [Satisfy]

115.

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$\left(\frac{\sec\theta-1}{\sec\theta+1}\right)^n = \text{cosec}\theta-\cot\theta$

$\left(\frac{1-\cos\theta}{1+\cos\theta}\right)^n = \text{LHS}$

RHS $\Rightarrow$ $\text{cosec}\theta - \cot\theta$

$\frac{1-\cos\theta}{\sin\theta} = \frac{2\sin^2\theta/2}{2\sin\theta/2\cos\theta/2}$

$\left(\tan\theta/2\right)^1$

$\frac{2\sin^2\theta/2}{2\cos^2\theta/2} = \left(\tan^2\frac{\theta}{2}\right)^n$

$\left(\tan\frac{\theta}{2}\right)^{2n} = \left(\tan\frac{\theta}{2}\right)^1$

$n = 0.5$

116.

$(2\cos^2\theta-1)\left[\frac{1+\tan\theta}{1-\tan\theta}+\frac{1-\tan\theta}{1-\tan\theta}\right]$

$\cos2\theta\left[\frac{2(1+\tan^2\theta)}{1-\tan^2\theta}\right]$

$= \frac{2\cos2\theta}{\cos2\theta} = 2$

117.

$\cos\theta+\sin\theta = \sqrt{2}\cos\theta$

$\cos^2\theta+\sin^2\theta+2\sin\theta\cos\theta = 2\cos^2\theta$

$2\sin\theta\cos\theta = \cos^2\theta-\sin^2\theta$

$\cos\theta-\sin\theta = \frac{2\sin\theta}{\sqrt{2}\cos\theta} = \sqrt{2}\sin\theta$

118.

$\sec^2\theta+\tan^2\theta-3\tan\theta=0$

[divide by $\cos^2\theta$]

$2\tan^2\theta-3\tan\theta+1=0$

$\tan\theta = 1, \frac{1}{2}$

$\cot\theta = 1, 2$ Ans

119.

$\cos^2\theta-\sin^2\theta = 5/6$

$\cos2\theta = 5/6$

120.

$\cos A = 1-\cos^2 A$

$\cos A+\cos^2 A = 1$

cubing both side

$\cos^3 A+\cos^6 A+3\cos^5 A+3\cos^4 A = 1$

Putting $\cos A = \sin^2 A$

$\sin^6 A+\sin^{12} A+3\sin^{10} A+3\sin^8 A = 1$

$\therefore a=1, b=3, c=3$

Acc/eq :- $a+b+c = 1+3+3=7$

121.

Formula :-

$\cos(A-B) = \cos A\cdot\cos\theta+\sin A\sin B$

$\cos(54-A) = \sin(36+A)$

$\cos(54+A) = \sin(36-A)$

Acc to formula –

$\cos(54-A-54-A) = \cos(-2A)$

$= \cos2A$

122.

$2\frac{\cos^4 x-1}{\sin^2 x} = a+b\cos2x$

$-2(\cos^2 x-1)(\cos^2 x+1)$

$\sin^2 x$

$= -2\cos^2 x-2 \Rightarrow -(2\cos^2 x-1)-3$

$= -\cos2x-3 = a+b\cos2x$

$a=-3, b=-1$

123.

$2\cos135\cdot\sin15$

$2\times\left(\frac{-1}{\sqrt{2}}\right)\left[\frac{\sqrt{3}-1}{2\sqrt{2}}\right]$

$= \frac{1-\sqrt{3}}{2}$

124.

$\sec x = 4, \cos x = \frac{1}{4}$

$4-\frac{1}{4} = 4$

to find $\frac{1}{\cos x}+\cos x$

$\sec x+\cos x$

$4+\frac{1}{4} \Rightarrow \sqrt{4^2+4} = \sqrt{20}$

$= 2\sqrt{5}$

125.

$\tan(\alpha+\beta) = \sqrt{3}$, & $\tan(\alpha-\beta) = 1$

$\alpha+\beta = 60$

$\alpha-\beta = 45$

$\times 3\begin{cases}2\alpha = 105\\ 6\alpha = 315\end{cases}$

$\tan6\alpha \Rightarrow \tan315^\circ$

$= -\tan45^\circ = -1$

126.

$\sin y = x$

$\cos2y = 1-2\sin^2 y$

$= 1-2x^2$

127.

$A+B = C$

$\tan(A+B) = \tan C$

$\frac{\tan A+\tan B}{1-\tan A\tan B} = \tan C$

$\tan A+\tan B = \tan C-\tan A\tan B\tan C$

So $\tan A\tan B\tan C = \tan C-(\tan A+\tan B)$

$= \tan C-\tan A-\tan B$

128.

$\sin3\theta = 3\sin\theta-4\sin^3\theta$

$\sin10 = \frac{4}{3}\sin^3 10$

$= \frac{1}{3}(3\sin10-4\sin^3 10)$

$= \frac{1}{3}\sin30^\circ = \frac{1}{6}$

129.

$\frac{2\tan60^\circ}{1+\tan^2 60^\circ} = \sin(2\times60^\circ)$

$= \sin120^\circ \Rightarrow \sin60^\circ$

130.

$\frac{\sec\theta+\tan\theta}{\sec\theta-\tan\theta} = \frac{7}{1}$

$\frac{\sec\theta}{\tan\theta} = \frac{4q+1}{4q-1}$

$\frac{1}{\sin\theta} = \frac{50}{48}$, $5\sin\theta = \frac{24}{5}$

131.

$\tan^2\theta+\cot^2\theta-\sec^2\theta\cdot\text{cosec}^2\theta$

$1+1-2\times2 = -2$ [Put $\theta = 45^\circ$]

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132.

$\sec\theta + \tan^2\theta \cdot \operatorname{cosec}\theta$

$\frac{1}{\cos\theta} + \frac{\sin^2\theta}{\cos^2\theta} \cdot \frac{1}{\sin\theta}$

$= \frac{1}{\cos\theta}(1+\tan^2\theta)$

$= \sec\theta(1+\tan^2\theta)$ $\left[\sec\theta = \sqrt{(1+\tan^2\theta)}\right]$

$= (1+\tan^2\theta)^{3/2}$

$= (2-\theta^2)^{3/2}$

133.

$\operatorname{cosec}\theta - \cot\theta = 1/4$

$\operatorname{cosec}\theta + \cot\theta = 4$

$2\cot\theta = 4 - \frac{1}{4} = \frac{15}{4}$

$\tan\theta = \frac{8}{15}$

134.

$\frac{1-\cos\theta}{\sin\theta} = \frac{1}{5}$

$\frac{1-\cos\theta}{\sin\theta}\frac{(1+\cos\theta)}{1+\cos\theta}$

$= \frac{\sin\theta}{1+\cos\theta} = \frac{1}{5}$

$\frac{1+\cos\theta}{\sin\theta} = 5$

135.

Put $\theta = 90$

$5(1+0) + 3(1+0) + 0$

$= 8$

136.

$\cos 45^\circ \sin 15^\circ$

$\frac{1}{\sqrt{2}}\left(\frac{\sqrt{3}-1}{2\sqrt{2}}\right)$

$= \frac{\sqrt{3}-1}{4}$

137.

$1 + \sin\theta = m\cos\theta$

$\sec\theta + \tan\theta = m$

$\sec\theta - \tan\theta = \frac{1}{m}$

$\sec\theta = \frac{1}{2}\left(m + \frac{1}{m}\right)$

$\cos\theta = \frac{2m}{m^2+1}$

$\sin\theta = \frac{m^2-1}{m^2+1}$

138.

$\tan^2\theta + \tan^4\theta = 1$

$\tan^2\theta(\sec^2\theta) = 1$

$\frac{s^2}{c^4} = 1$

$1 - c^2 = c^4$

$c^4 + c^2 = 1$

139.

$\tan 40^\circ = \alpha$, $\cot 40^\circ = 1/\alpha$

$= \frac{-\tan 40 + \cot 40}{1 + (-\tan 40 \cdot (-\cot 40^\circ))}$

$= \frac{\frac{1}{\alpha} - \alpha}{1 - \alpha\cdot\frac{1}{\alpha}} = \frac{1-\alpha^2}{2\alpha}$

140.

$\sin^4\theta + \cos^4\theta$

$\sin^4\theta + (1-\sin^2\theta)^2$

$= \sin^4\theta + 1 + \sin^4\theta - 2\sin^2\theta$

$= 2\sin^4\theta - 2\sin^2\theta + 1$

141.

$\frac{\cos x - \sqrt{3}\sin x}{2}$

$= \frac{1}{2}\cos x - \frac{\sqrt{3}}{2}\sin x$

$= \cos 60^\circ \cdot \cos x - \sin 60^\circ \sin x$

$= \cos(60 + x)$

$= \cos(\pi/3 + x)$

142.

$\sin^2\theta + \cos^2\theta + 2\sin\cdot\cos = \frac{4-2\sqrt{3}}{8}$

$\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}$

$\frac{\sin^2\theta + \cos^2\theta}{\sin\theta\cdot\cos\theta} = \frac{1}{\frac{1}{2}\left(\frac{4-2\sqrt{3}}{8}-1\right)}$

$\frac{1 \times 16}{(4-2\sqrt{3}-8)}$

$= \frac{16}{2(-\sqrt{3}-2)}$

$= \frac{8}{-(\sqrt{3}+2)} \times \frac{(\sqrt{3}-2)}{(\sqrt{3}-2)}$

$= \frac{8(\sqrt{3}-2)}{-1\times(-1)} = 8(\sqrt{3}-2)$

143.

$\sec^2\theta = (4+\theta^2)$

या $\sec\theta = (4+\theta^2)^{1/2}$

eq 2nd —

$\sec\alpha + \frac{\sin^2}{\cos^2\alpha}\cdot\sec\alpha$

$\sec\alpha(1+\tan^2\alpha)$

$\sec^3\alpha = (4+\theta^2)^{3/2}$

144.

$\frac{17}{23} = \frac{m}{299}$

$m = 221$

145.

$\sin^2\theta + \cos\operatorname{ec}^2\theta + 2\sin\theta\cdot\cos\operatorname{ec}\theta$
$+ \cos^2\theta + \sec^2\theta + 2\cos\cdot\sec$

$1 + 2 + 2 + 1 + \cot^2\theta + 1 + \cot^2\theta$

$7 + \tan^2\theta + \cot^2\theta$

146.

$\left(\frac{1+\sec^2\theta}{1+\cos^2\theta}\right)\left(\frac{1+\sin^2\theta}{1+\operatorname{cosec}^2\theta}\right)$

$\Rightarrow \left(\frac{1+\frac{1}{\cos^2\theta}}{1+\cos^2\theta}\right)\left(\frac{1+\sin^2\theta}{1+\frac{1}{\sin^2\theta}}\right)$

$\Rightarrow \left(\frac{1}{\cos^2\theta}\right)(\sin^2\theta)$

$\Rightarrow \tan^2\theta$

147.

$\frac{\tan A - \sin A}{\tan A + \sin A}$

$\frac{\frac{\sin A}{\cos A} - \sin A}{\frac{\sin A}{\cos A} + \sin A} \Rightarrow \frac{\frac{\sin A(1-\cos A)}{\cos A}}{\frac{\sin A(1+\cos A)}{\cos A}}$

$\Rightarrow \frac{1-\frac{1}{\sec A}}{1+\frac{1}{\sec A}} = \left(\frac{\sec A - 1}{\sec A + 1}\right)$

148.

$\frac{1+\sin A}{\cos^2 A}$

$= \frac{1+\sin A}{1-\sin^2 A}$

$= \frac{1+\sin A}{(1+\sin A)(1-\sin A)}$

$= \frac{1}{1-\sin A}$ (Ans)

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149.

$$\sqrt{\frac{\text{cosec}A+1}{\text{cosec}A-1}}\times\frac{\text{cosec}+1}{\text{cosec}+1}+\sqrt{\frac{\text{cosec}-1}{\text{cosec}+1}}\times\frac{\text{cosec}-1}{\text{cosec}-1}$$

$$\frac{\text{cosec}+1}{\text{Cot}A}+\frac{\text{cosec}-1}{\text{Cot}A}=\frac{2\,\text{cosec}A}{\text{Cot}A}$$

$$\frac{\frac{2}{\sin A}}{\frac{\cos A}{\sin A}}=2\sec A \quad (\text{Ans})$$

150.

$$\tan A=3 \Rightarrow \frac{\sin A}{\cos A}=\frac{3}{1}$$

$k=\sqrt{10}$,

$$3\times 2\sin A\cos A=3\times\frac{3}{\sqrt{10}}\times\frac{1}{\sqrt{10}}$$

$$\Rightarrow \frac{9}{10}$$

151.

$m=2\sec\theta-2\tan\theta$

$n=\text{cosec}\theta+\cot\theta$

$(\theta=45^\circ)$

$m=\sqrt{2}-1$, $n=\sqrt{2}+1$

$m+n(m-1)=m+nm-n$

$\Rightarrow \sqrt{2}-1+1-(\sqrt{2}+1)$

$\Rightarrow -1$

152.

$(\sec-\tan+1)(\sec-\tan-1)$

$(\sec-\tan)^2-(1)^2$

$\sec^2A+\tan^2A-2\tan\sec-1$

$\cancel{1}+\tan^2A+\tan^2A-\cancel{1}-2\tan\sec A$

$2\tan A(\tan A-\sec A)$

153.

$\sec x+\tan x=5$, $\text{cosec}\,y-\cot y=1/3$

$\sec x-\tan x=1/5$, $\therefore \text{cosec}\,y+\cot y=3$

$\sec x+\text{cosec}\,y-\tan x+\cot y$

$\frac{1}{5}+3=\frac{16}{5}=3.2$ [Ans]

154.

$$\frac{1-\sin A}{\cos A}+\frac{\cos A}{1-\sin A}$$

$$\frac{(1-\sin A)^2+\cos^2A}{(\cos A)(1-\sin A)}=\frac{1+\sin^2A-2\sin A+\cos^2A}{\cos A(1-\sin A)}$$

$$\frac{2-2\sin A}{\cos A(1-\sin A)}=\frac{2[1-\sin A]}{\cos A(1-\sin A)}=2\sec A$$

155.

$$\frac{1+\tan A}{\cos A}+\frac{1+\cot A}{\sin A}$$

$$\frac{1+\frac{\sin A}{\cos A}}{\frac{1}{\sin A}}+\frac{1+\frac{\cos A}{\sin A}}{\frac{1}{\cos A}}$$

$$=\frac{(\cos A+\sin A)\sin A}{\cos A}+\frac{(\sin+\cos A)\cos A}{\sin A}$$

$$(\sin A+\cos A)\left[\frac{\sin A}{\cos A}+\frac{\cos A}{\sin A}\right]$$

$$=\left[\frac{\sin^2A+\cos^2A}{\sin A\cos A}\right](\sin A+\cos A)$$

$$=\frac{1}{\sin A\cos A}[\sin A+\cos A]=[\sec A+\text{cosec}A]$$

156.

A^2-B^2.

$a^2\,\text{cosec}^2\theta+b^2\cot^2\theta+2ab\,\text{cosec}\theta\cot\theta$

$[a^2\cot^2\theta+b^2\,\text{cosec}^2\theta+2ab\,\text{cosec}\cot\theta]$

$a^2[\text{cosec}^2\theta-\cot^2\theta]+b^2[\cot^2\theta-\text{cosec}^2\theta)$

$a^2[1]-b^2[\text{cosec}^2\theta-\cot^2\theta]$

$=[a^2-b^2]$ Ans

157.

$\text{cosec}\theta+\cot\theta=2$

$\text{cosec}\theta-\cot\theta=1/5$

$2\,\text{cosec}\theta=2+\frac{1}{2}$

$\text{cosec}\theta=\frac{5^2+1}{2\cdot5}$

By triplet or Pythagorean Property

$\left[\cos\theta=\frac{5^2-1}{5^2+1}\right]$

158.

$$\frac{1+\frac{\sin A}{\cos A}}{\frac{1}{\sin A}}+\frac{1+\frac{\cos A}{\sin A}}{\frac{1}{\cos A}}$$

$$\frac{(\cos A+\sin A)\sin A}{\cos A}+\frac{\cos A(\sin A+\cos A)}{\sin A}$$

$$\cos A+\sin A\left[\frac{\sin^2A+\cos^2A}{\sin A\cos A}\right]$$

$$\frac{\cos A+\sin A}{\sin A\cos A}$$

$\sec A+\text{cosec}A$

159.

$\sin^4x+\sin^2x=1$

$(\sin^4x=\cos^2x)$

$(\sin^2x=\cot^2x)$

$\sin^4x=\cot^4x$

find $\cot^4x+\cot^2x$

$\sin^4x+\sin^2x$

$\sin^4x+\sin^2x=1$

160.

$\sin m+\sin n=p$, $\cos m+\cos n=q$

$\sin^2m+\sin^2n+2\sin m\sin n=p^2$

$\cos^2m+\cos^2n+2\cos m\cos n=q^2$

Adding of Both P^2+q^2

$P^2+q^2=$

$2+2\sin n*\sin m+2\cos m*\cos n$

$(P^2+q^2-2)/2$

$=\sin n*\sin m+\cos m*\cos n$

161.

$\tan\alpha+\sin\alpha=A$

$\tan\alpha-\sin\alpha=B$

$(A+B)(A-B)=4\tan\alpha\times2\sin\alpha$

$A^2-B^2=4\tan\alpha\sin\alpha$

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$\frac{2\cos^3 - \cos A}{\sin A - 2\sin^2 A} = 1$

$2\cos^3 A - \cos A = \sin A - 2\sin^2 A$

$(A = 45°)$ Let

$\frac{2\times 1}{2\sqrt{2}} - \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}}$

(✓)

$(A = 45°)$ (Ans)

163.

If - $\tan A + \sec A = K$

So - $\sec A - \tan A = 1/K$

$\sec A = \frac{K^2+1}{2K}$

$\sin A = \frac{K^2-1}{K^2+1}$

164.

Let $\theta = 45°$

$\sqrt{2}\sec^2\theta - 4\sec\theta + 2\sqrt{2} = 0$

$\sqrt{2}\times 2 - 4\sqrt{2} + 2\sqrt{2} = 0$ (✓)

$\sin^2\theta + \tan^2\theta = \frac{1}{2} + 1 = \frac{3}{2}$

165.

$(\sin\theta + \cos\theta)^2 = \left(\frac{\sqrt{11}}{3}\right)^2$

$1 + 2\sin\theta\cdot\cos\theta = \frac{11}{9}$

$\sin\theta\cdot\cos\theta = \frac{1}{9}$

$\tan\theta + \cot\theta$

$= \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}$

$= \frac{\sin^2\theta + \cos^2\theta}{\cos\theta\cdot\sin\theta} = \frac{1}{\frac{1}{9}}$

$= 9$

166.

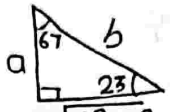
$\cos(A+B) + \cos(A-B) = 2\cos A\cdot$

$= \frac{\cos 72 + \cos 2A}{2} + \frac{\cos 108 + \cos 2}{2}$

$= \frac{\cos 72 + \cos 2A + (-\cos 72) + \cos}{2}$

$= \cos 2A$

167.



$\sqrt{b^2-a^2}$

$= \frac{b}{\sqrt{b^2-a^2}} - \frac{\sqrt{b^2-a^2}}{b}$

$= \frac{b^2 - b^2 + a^2}{b\sqrt{b^2-a^2}} = \frac{a^2}{b\sqrt{b^2-a^2}}$

168.

$\frac{\frac{\sin\beta}{\sec\alpha}}{\frac{\cos\beta}{\sec\alpha}} = \frac{16}{15}$

$\left(\frac{\sin\beta}{\cos\beta}\right)^2 = \left(\frac{16}{15}\right)^2$

$= \frac{\sin^2\beta}{1-\sin^2\beta} = \frac{256}{225}$

$\sin^2\beta = \frac{256}{481}$

169.

$\sec\theta + \tan\theta = 5$

$\sec\theta - \tan\theta = 1/5$

$2\sec\theta = \left(5 + \frac{1}{5}\right)$

$\sec\theta = \frac{1}{2}\left(5 + \frac{1}{5}\right)$

$*(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$

170.

$\sec\theta + \frac{1}{\sec\theta} = 32$

$\sec^2\theta + \frac{1}{\sec^2\theta} = (32)^2 - 2$

$= 1022$

171.

$\sin t + \cos t = \frac{4}{5}$

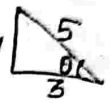
$\sin^2 t + \cos^2 t + 2\sin t\cdot\cos t = 16/25$

$1 + 2\sin t\cdot\cos t = \frac{16}{25}$

$\sin\theta\cdot\cos t = \frac{-9}{50}$

172.

$\sin\theta = \frac{4}{5}$



$\tan\theta - \cot\theta$

$\frac{4}{3} - \frac{3}{4} = \frac{7}{12}$

173.

$\tan\frac{A}{2} = x$

Put $A = 60°$

$\tan 30 = x$

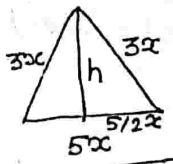
$x = \frac{1}{\sqrt{3}}$

by option

$\sqrt{\frac{1-\cos A}{1+\cos A}} = \sqrt{\frac{1-\frac{1}{2}}{1+\frac{1}{2}}} = \sqrt{\frac{2}{6}}$

$= \sqrt{\frac{1}{3}} = \frac{1}{\sqrt{3}}$

174.



$h = \sqrt{9x^2 - \frac{25x^2}{4}}$

$h = \frac{\sqrt{11}}{2}x$

$A = \frac{1}{2}\times 5\times\frac{\sqrt{11}}{2}x^2 = 30\sqrt{11}$

$\pm x^2 = 24$

$x = 2\sqrt{6}$

$5x = 10\sqrt{6}$

175.

$\left(\frac{1}{\sin\theta} + \frac{\cos\theta}{\sin\theta}\right)\left(\frac{1}{\sin\theta} - \frac{\cos\theta}{\sin\theta}\right)$

$\frac{1-\cos^2\theta}{\sin^2\theta}$

$\frac{\sin^2\theta}{\sin^2\theta} = 1$

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176.

$\sin 2x + \sin 6x + 2\sin 4x$

$2\sin\left(\frac{6x+2x}{2}\right)\cdot\cos\left(\frac{6x-2x}{2}\right) + 2\sin 4x$

$2\sin 4x\cdot\cos 2x + 2\sin 4x$

$2\sin 4x\,(\cos 2x + 1)$

$2\sin 4x\cdot 2\cos^2 x$

$4\cos^2 x\cdot\sin 4x$

177.

$\sin A = -\frac{3}{5} = \frac{P}{h}$

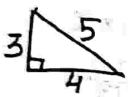
$b = 4$

$\sec A = -\frac{5}{4}$

$\sin A = -\frac{3}{5}$

$\cos A = -\frac{4}{5}$

$\sec A = -\frac{5}{4}$



178.

Put $\theta = 0°$

$12(0+1) + 18(0+1) + 78\times 0\times 1$

$12 + 18 = 30$

179.

$\tan 15° = \tan(45-30)$

$= \frac{\tan 45 - \tan 30}{1 + \tan 45\cdot\tan 30}$

$= \frac{1 - \frac{1}{\sqrt{3}}}{1 + \frac{1}{\sqrt{3}}\times 1} = \frac{\sqrt{3}-1}{\sqrt{3}+1}\times\frac{\sqrt{3}-1}{\sqrt{3}-1}$

$= \frac{4 + (-2\sqrt{3})}{2}$

$= 2 - \sqrt{3}$

180.

$\because \cos\alpha = \frac{3}{P}$

$\tan\alpha = \frac{Q}{4}$

$\tan^2\alpha = \frac{Q^2}{16}$

$1 + \tan^2\alpha = \frac{Q^2}{16} + 1$

$\sec^2\alpha = \frac{Q^2}{16} + 1$

$\frac{P^2}{9} - \frac{Q^2}{16} = 1$

181.

$\sec A + \tan A = 3$

$\sec A - \tan A = \frac{1}{3}$

$2\sec A = \frac{10}{3}$

$\sec A = \frac{5}{3}$

$\cos A = \frac{3}{5}$

182.

$\operatorname{cosec}(16\pi + 30) + \sec(24\pi - 60) + \tan(14\pi - 45) + \cot(10\pi - 45)$

$= 2 + 2 + 1 - 1$

$= 4$

183.

$\operatorname{cosec}(45+30)$

$\frac{\operatorname{cosec}45\cdot\sec 30\cdot\operatorname{cosec}30\cdot\sec 45}{\sec 45\cdot\operatorname{cosec}30 + (\operatorname{cosec}45\cdot\sec 30)}$

$\frac{\sqrt{2}\times\frac{2}{\sqrt{3}}\times 2}{\frac{2}{\sqrt{3}} + 2} = \sqrt{6} - \sqrt{2}$

184.

$\tan(-1125)$

$-\tan(3\times 360 + 45)$

$-\tan 45° = -1$

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185.

$3\cot A = \frac{7}{3}$

$\cot A = \frac{7}{9}$

$\frac{(3\cos A + 2\sin A)\div\sin\theta}{(3\cos A - 2\sin A)\div\sin\theta}$

$\frac{3\cot A + 2}{3\cot A - 2} = \frac{\frac{7}{3}+2}{\frac{7}{3}-2}$

$= 13$

186.

$x = \frac{\sec A}{3}$

$\frac{1}{x} = \frac{\tan A}{3}$

$9\left(\frac{\sec^2 A}{9} - \frac{\tan^2 A}{9}\right)$

$9\times\frac{1}{9} = 1$

187.

$\tan^2\theta = 1 - \tan^4\theta$

$= (1+\tan^2\theta)(1-\tan^2\theta)$

$= \sec^2\theta\,(1-\tan^2\theta)$

$\tan^2\theta - \sec^2\theta = -\sec^2\theta\cdot\tan^2\theta$

$-1 = -\sec^2\theta\cdot\tan^2\theta$

$\frac{\sin^2\theta}{\cos^2\theta}\times\frac{1}{\cos^2\theta} = 1$

$\cos^4\theta = \sin^2\theta$

$11\,(\sin^2\theta + \cos^2\theta)$

$11\times 1 = 11$

188.

$\sqrt{2+\sqrt{2+2\cos 8\theta}}$

$= \sqrt{2(1+\cos 8\theta)}$

$= \sqrt{2\times 2\cos^2 4\theta}$

$= \sqrt{2+4\cos^2 4\theta}$

$= \sqrt{2+2\cos 2\theta}$

$= \sqrt{2(2\cos^2\theta)}$

$= 2\cos\theta$

$1+\cos 2\theta = 2\cos^2\theta$

189.

$\theta = 45°$

$\left(\frac{1}{\sqrt{2}}\right)^8 + \left(\frac{1}{\sqrt{2}}\right)^8$

$\frac{1}{16} + \frac{1}{16} = \frac{1}{8}$

190.

$a^2+b^2 = x^2+y^2$ [formula]

$4^2+5^2 = 3^2+y^2$

$y^2 = 32$

$y = 4\sqrt{2}$

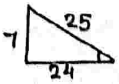
191.

$\left(\frac{\cos\theta}{\sin\theta} - \frac{\sin\theta}{\cos\theta}\right)\cos\theta\cdot\sin\theta$

$\frac{(\cos^2\theta - \sin^2\theta)}{\sin\theta\cdot\cos\theta}\cos\theta\cdot\sin\theta$

$= 2\cos^2\theta - 1$

192.



$\frac{25}{7} + \frac{24}{7} = 7$

$\because \operatorname{cosec} A = \frac{25}{7}$

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193.

$\text{Cosec}A + \cot A = a\sqrt{b}$

$\text{Cosec}A - \cot A = \frac{1}{a\sqrt{b}}$

$2\,\text{Cosec}A = a\sqrt{b} + \frac{1}{a\sqrt{b}}$

$\text{Cosec}A = \frac{a^2b+1}{2a\sqrt{b}} = \frac{h}{p}$

$B = a^2b - 1$

$\cos A = \frac{B}{H} = \frac{a^2b-1}{a^2b+1}$

194.

$\sin\alpha + \cos\alpha = \frac{2}{\sqrt{3}}$

$\sin^2\alpha + \cos^2\alpha + 2\sin\cdot\cos = \frac{4}{3}$

$2\sin\alpha\cdot\cos\alpha = \frac{4}{3} - 1$

$\sin\alpha\cdot\cos\alpha = \frac{1}{3\times 2} = \frac{1}{6}$

$\tan\alpha + \cot\alpha = \frac{\sin\alpha}{\cos\alpha} + \frac{\cos\alpha}{\sin\alpha}$

$= \frac{1}{\cos\alpha\cdot\sin\alpha}$

$= 6$

195.

$\cot^2A + \cos^2A + 2\cot\cdot\cos A = P^2$

$\cot^2A + \cos^2A - 2\cot\cdot\cos A = Q^2$

$P^2 - Q^2 = 4\frac{\cos^2A}{\sin^2A}$

$\sqrt{PQ} = \cot^2A - \cos^2A$

$= \frac{\cos^2A(1-\sin^2A)}{\sin^2A}$

$= \sqrt{\frac{\cos^4A}{\sin^2A}} = \frac{\cos^2A}{\sin A}$

$P^2 - Q^2 = 4\sqrt{PQ} \Rightarrow \sqrt{16PQ}$

196.

$\sin\theta + \cos\theta = 1/29$

$\sin\theta - \cos\theta = \sqrt{2 - \frac{1}{841}} = \sqrt{\frac{1681}{841}}$

$= \frac{41}{29}$

$\frac{\sin\theta+\cos\theta}{\sin\theta-\cos\theta} = \frac{1/29}{41/29} = \frac{1}{41}$

197.

$\frac{1}{\sin\theta} - \frac{\cot^2\theta}{1+\text{cosec}\theta}$

$\frac{1}{\sin\theta} - \frac{\text{cosec}^2\theta - 1}{1+\text{cosec}\theta}$

$\frac{1}{\sin\theta} - \frac{(\text{cosec}\theta - 1)(\text{cosec}\theta + 1)}{(1+\text{cosec}\theta)}$

$\text{Cosec}\theta - \text{cosec}\theta + 1$

$= 1$

198.

$\frac{\sin 58}{\sin 58} + \frac{\sin 55\cdot\sec 35}{\tan 5\cdot\tan 45\cdot\tan 85}$

$1 + \frac{\sin 55}{\cos 35\times 1\times\tan 5\times\cot 5}$

$1 + \frac{\sin 55}{\sin 55\times 1\times 1}$

$1 + 1 = 2$

199.

$A = 0°$ रखने पर

$\frac{1}{1+0} + \frac{1+0}{1} + 2 = 4$

option D : $2(1+1) = 4$.

200. CurrentMUDDE

$\sec\theta + \tan\theta = \frac{1}{\sqrt{3}}$

$\sec\theta + \tan\theta = \sqrt{3}$

$2\sec\theta = \frac{1}{\sqrt{3}} + \sqrt{3}$

$\sec\theta = \frac{2}{\sqrt{3}}$

$\theta = 30°$

$\cot 30 + \cos 30 = \sqrt{3} + \frac{\sqrt{3}}{2} = \frac{3\sqrt{3}}{2}$

...

201.

$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A\cdot\tan B}$

$= \frac{\frac{1}{2} + \frac{1}{3}}{1 - \frac{1}{2}\times\frac{1}{3}} = \frac{\frac{5}{6}}{\frac{5}{6}} = 1$

$A + B = 45°$

202.

$\frac{(\cot A - 1)(\cot^2A + 1 + \cot A)}{(\cot A - 1)}$

$= \text{Cosec}^2A + \cot A.$

203.

$\sin\theta\cdot\cos\theta = 2\cos^3\theta - \frac{1}{4}\cos\theta$

$\sin\theta = 2(1-\sin^2\theta) - \frac{1}{4}$

$2\sin^2\theta + \sin\theta - \frac{7}{4} = 0$

$\sin\theta = \frac{-1 \pm \sqrt{1+14}}{4}$

$= \frac{-1+\sqrt{15}}{4}$

204.

$\frac{\cos 25 - \cos 65}{\cos 25 + \sin 65}$

$= 0$

205.

$P\times\frac{\sqrt{3}}{2} = Q\times\sqrt{2}$

$\frac{P}{Q} = \frac{2\sqrt{2}}{\sqrt{3}}$

$\frac{P^2+Q^2}{P^2-Q^2} = \frac{8+3}{8-3} = \frac{11}{5}$

206.

Let $\sec^2\theta = x$

$3x^2 - 10x + 8 = 0$

$(x-2)(3x-4) = 0$

$\sec^2\theta = 2, \frac{4}{3}$

$\tan\theta = \sqrt{\sec^2\theta - 1}$

$= \sqrt{2-1} = 1$

$= \sqrt{\frac{4}{3} - 1} = \frac{1}{\sqrt{3}}$

207.

$\text{Cosec}\theta\left[\frac{1+\cos\theta}{\sin\theta} + \frac{\sin\theta}{1+\cos\theta}\right] - 2\cot^2\theta$

$\text{Cosec}\theta\left[\frac{1+\cos\theta}{\sin\theta} + \frac{\sin\theta(1-\cos\theta)}{\sin^2\theta}\right] - 2\cot^2\theta$

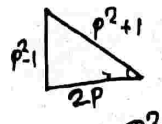
$\text{Cosec}\theta\left[\frac{1+\cos\theta+1-\cos\theta}{\sin\theta}\right] - 2\cot^2\theta$

$2\,\text{Cosec}^2\theta - 2\cot^2\theta$

$= 2(\text{cosec}^2\theta - \cot^2\theta)$

$= 2$

208.



$\text{Cosec}A = \frac{P^2+1}{P^2-1}$

209.

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$7(1)^3 + 8(1)^4 - (2)^2 + (-3)^3$

$7+8-4-27$

$= -16$

210.

$6A + A - 29 = 90$

$7A = 119$

$A = 17$

211.

$\frac{\sin}{C} + \frac{C}{S} = 1$

$\cos \cdot \sin = 1$

$(\sin + \cos)^2 = 1 + 2$

$= 3$

$\cos + \sin = \sqrt{3}$

$= \frac{1}{\sqrt{3}}$

212.

$a^2 = \sin^2 x + \sin^2 y + 2\sin x \cdot \cos x$

$b^2 = \cos^2 x + \cos^2 y + 2\cos x \cdot \cos y$

$a^2 + b^2 = 2 + 2(\sin x \cdot \cos x + \cos x \cdot \cos y)$

$\Rightarrow \frac{a^2 + b^2 - 2}{2}$

213.

$A = 45$

$(1+1-\sqrt{2})(1+1+\sqrt{\ }) - 3 \times 1$

$2^2 - (\sqrt{2})^2 = 3$

$2 - 3 = -1$

214.

$\frac{\sec + \tan}{\sec - \tan} = \frac{209}{79}$

$\frac{1 + \sin}{1 - \sin} = \frac{209}{79}$

$\frac{1}{\sin} = \frac{209 + 79}{209 - 79} = \frac{288}{130}$

$\sin = \frac{65}{144}$

215.

$\frac{\cos 13 + \sin 13}{\cos 13 - \sin 13} \Big] \begin{matrix} 2 \times \sin 45 \\ 2 \times \sin 45 \end{matrix}$

$\frac{2\sin 45 \cdot \cos 13 - 2\sin 45 \cdot \sin 13}{2\sin 45 \cdot \cos 13 - 2\sin 45 \cdot \sin 13}$

$\frac{\sin 58 + \sin 32 + \cos 32 - \cos 58}{\sin 58 + \sin 32 - \cos 32 + \cos 58}$

$\frac{\sin 58 + \cos 32}{\sin 32 + \cos 58} = \frac{2\sin 58}{2\cos 58}$

$= \tan 58$

216.

$\sin x + \cos x = \sqrt{2}\sin x$

$\sin x - \cos x = P \quad$ (Squaring both)

$(\sin^2 x + \cos^2 x)(1^2 + 1^2) = 2\sin^2 x + P^2$

$2 - 2\sin^2 x = P^2$

$P = \sqrt{2\cos^2 x} = \sqrt{2}\cos x.$

217.

$4\sin^2\theta = 3 + 3\cos\theta$

$4 - 4\cos^2\theta = 3 + 3\cos\theta$

$4\cos^2\theta + 3\cos\theta - 1 = 0$

$\cos\theta = \frac{1}{4} \quad \frac{-5}{h} \quad P = \sqrt{15}$

$\sqrt{15} \times \frac{\sqrt{15}}{1} + \frac{4}{\sqrt{15}} \times \frac{\sqrt{15}}{4} + 2 \times 8$

$= 24$

218.

$12 + 7 > x > 12 - 7$

$19 > x > 5$

$x = 6, 7, 8, 9 \ldots\ldots 18$

$Total = 13.$

219.

$T^2(1+T^2) = \tan^2 \times \sec^2$

$= (\sec^2 - 1)\sec^2$

$= \sec^4 - \sec^2$

220.

$A = 60, B = 45$

$\sqrt{3} = a \times 1$

$a = \sqrt{3}$

$b = \frac{\sqrt{3}}{\sqrt{2}}$

by option $\frac{b^2 - 1}{a^2 - 1} = \cos^2 A$

221.

$\frac{\sin A \cdot \cos B - \cos A \cdot \sin B}{\cos A \cdot \cos B} + \frac{\sin B \cdot \cos C - \cos B \sin C}{\cos B \cdot \cos C}$

$\frac{\cos C(\sin A \cdot \cos B - \cos A \cdot \sin B) + \cos A(\sin B \cdot \cos C - \cos B \sin C)}{\cos A \cdot \cos B \cdot \cos C}$

$\frac{\cos C \cdot \sin A \cdot \cos B - \cos A \sin B \cdot \cos C + \cos A \sin B \cdot \cos C - \cos A \cdot \cos B \cdot \sin C}{\cos A \cdot \cos B \cdot \cos C}$

$\frac{(\sin A \cdot \cos C - \cos A \cdot \sin C)\cos B}{\cos A \cdot \cos B \cdot \cos C}$

$\frac{\sin(A - C)}{\cos A \cdot \cos C}$

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222.

$\cos^{-1}\frac{7}{25} = \theta \qquad \cos^{-1}\frac{15}{17} = \alpha$

$\cos\theta = \frac{7}{25} \qquad \cos\alpha = \frac{15}{17}$

$\sin\theta = \frac{24}{25} \qquad \sin\alpha = \frac{8}{17}$

$\sin(\theta - \alpha) = \sin\theta \cdot \cos\alpha - \cos\theta \cdot \sin\alpha$

$= \frac{24}{25} \times \frac{15}{17} - \frac{7}{25} \times \frac{8}{17}$

$= \frac{304}{425}$

$\sin^{-1}\left(\frac{304}{425}\right)$

223.

$x^2 - y^2 = (x - y)(x + y)$

$2\sin \cdot 2\tan = 4\sin \cdot \tan A =$

$(\tan A + \sin A)(\tan - \sin) = xy$

$\tan^2 - \sin^2 = \sin^2\left(\frac{1 - \cos^2}{\cos^2}\right)$

$\sqrt{xy} = \sin^2 \cdot \tan^2 A$

$4\sqrt{xy}$

224.

$\sin 2A = \frac{2\tan A}{1 + \tan^2 A} = 2\sin \cdot \cos$

$2\sin \cdot \cos = \frac{2(\sqrt{2} - 1)}{1 + (\sqrt{2} - 1)^2}$

$\sin \cdot \cos = \frac{\sqrt{2} - 1}{4 - 2\sqrt{2}} = \frac{1}{2\sqrt{2}}$

$\sin \cos + \tan = \frac{1}{2\sqrt{2}} + \sqrt{2} - 1$

$\frac{1 + 4 - 2\sqrt{2}}{2\sqrt{2}} = \frac{5 - 2\sqrt{2}}{2\sqrt{2}}$

$= \frac{5\sqrt{2} - 4}{4}$

225.

$f(P) = \sin^{P+2} x + \cos^{P+2} x - 0$

$6(\sin^4 x + \cos^4 x) - 4(\sin^6 x + \cos^6 x) + 10$

$6(1 - 2\sin^2\cos^2 x) - 4(1 - 3\sin^2\cos^2 x) + 10$

$\Rightarrow 12.$

226.

$\frac{1}{\cos^4 2\alpha} + \frac{1}{-(1 - \sin^2 2\alpha)}$

$\frac{1}{\cos^4 2\alpha} - \frac{1}{\cos^2 2\alpha}$

$= \frac{1 - \cos^2 2\alpha}{\cos^4 2\alpha} = \frac{\sin^2 2\alpha}{\cos^2 2\alpha \cdot \cos^2 2\alpha}$

$= \tan^2 2\alpha \cdot \sec^2 2\alpha.$

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227.

$a\cos A + b\sin A$

$max = \sqrt{a^2+b^2}$

$\sqrt{7^2+24^2} + 32$

$25+32 = 57.$

228.

$\frac{x^2}{p^2} + \frac{y^2}{q^2} - \frac{z^2}{r^2}$

$\frac{p^2(\sec^2A)\cdot\cos^2B}{p^2} + \frac{q^2(\sec^2A)\cdot\sin^2B}{q^2} - \frac{r^2\tan^2A}{r^2}$

$= \frac{\cos^2B}{\cos^2A} + \frac{\sin^2B}{\cos^2A} - \tan^2A$

$\sec^2A - \tan^2A = 1.$

229.

$\tan(72-27) = \frac{\tan72-\tan27}{1+\tan72\cdot\tan27}$

$\downarrow$

1

$1+\tan72\cdot\tan27 = \tan72-\tan27$

$\tan72-\tan27-\tan72\tan27 = 1$

230.

$\sin\theta = \frac{2\tan\theta}{1+\tan^2\theta}$

$1 - \frac{2\tan\theta}{1+\tan^2\theta} \times \frac{(\cos\theta+\sin\theta)\times\frac{1}{\cos\theta}}{(\cos\theta-\sin\theta)\times\frac{1}{\cos\theta}}$

$\frac{}{1 + \frac{2\tan\theta}{1+\tan^2\theta}}$

$= \frac{(1-\tan\theta)^2}{(1+\tan\theta)^2} \times \frac{(1+\tan\theta)}{(1-\tan\theta)}$

$= \frac{1-\tan\theta}{1+\tan\theta}$

231.

$x = 45^\circ$

$a = b$

$a\times\frac{1}{2\sqrt{2}} + \frac{b}{2\sqrt{2}} = \frac{1}{\sqrt{2}}\times\frac{1}{\sqrt{2}}$

$a+b = \sqrt{2}$

$2a = \sqrt{2}, \quad a = \frac{1}{\sqrt{2}}$

$2a^2 = 2\times\frac{1}{2} = 1.$

232.

$P\cos A = 2Q\sin A$

$P\cos\sec A = 2Q\sec A$

$4Q\sec A - 2Q\sec A = 3$

$2\sec A = 1, \quad \cos A = 2$

$P\cos\sec A = 2, \quad P = 2\sin A$

$4\sin^2A + 4\cos^2A = 4$

233.

$\frac{1+\sin\theta+1-\sin\theta}{1-\sin^2\theta} = \frac{4}{\cos\theta}$

$\frac{2}{\cos^2\theta} = \frac{4}{\cos\theta}$

$\cos\theta = \frac{1}{2} = 60^\circ$

$\frac{1}{\sqrt{3}} + \frac{2}{\sqrt{3}} = \sqrt{3}.$

234.

$\sin81 = d = \cos59$

$\cos59 = \frac{d}{1}$ — b

$P = \sqrt{1-d^2}$ — h

$\cot59 = \frac{d}{\sqrt{1-d^2}}$

235.

$28S + 16C = 45S - 10C$

$26C = 17S$

$\tan = \frac{26}{17}$

$\frac{676 + 5\times289}{676 - 5\times289} = \frac{-2121}{769}$

236.

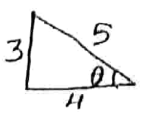
$\frac{1-\cos2\theta}{1+\cos2\theta} = \frac{2\sin^2\theta}{2\cos^2\theta}$

$\left(\frac{3}{4}\right)^2 = \tan^2\theta$

$= \frac{9}{16}$

237.

$\frac{3}{5}\sin A + \frac{4}{5}\cos A = 1$



$\tan A = \frac{3}{4}.$

238.

$\frac{\sin A}{1-\cos A} + \cot A$

$\frac{\sin A(1-\cos A)}{\sin^2 A} + \cot A$

$\cos\sec A - \cot A + \cot A$

$= \cos\sec A.$

239.

$\frac{a^2+c^2-2ac}{1} = \frac{5-2\sqrt{2}}{4}$

$\frac{4-5+2\sqrt{2}}{4\sqrt{2}} = 3.c$

$\frac{2\sqrt{2}-1}{8} = \sin\cdot\cos$

240.

$\frac{5}{\cos\sec^2\theta} + \frac{3}{\sec^2\theta} + 2\cos^2\theta$

$5\sin^2\theta + 3\cos^2 + 2\cos^2$

$5(\sin^2+\cos^2) = 5$

241.

$\cot^4\theta = \cos\sec^2\theta$

$\frac{\cos^4}{\sin^2} = 1, \quad \cos^4 = \sin^2$

$\cos^4 + \cos^2\theta = \sin^2+\cos^2$

$= 1$

242.

$1 + 2S\cdot C = \frac{1}{8}$

$S\cdot C = -\frac{7}{16}$

$S^4+C^4 = (S^2+C^2)^2 - 2S^2C^2$

$= 1 - 2\left(\frac{7}{16}\right)^2$

$= \frac{79}{128}$

243.

$\frac{1+\sin^2\theta+2\sin\theta+\cos^2\theta - 2(1+\sin\theta)\cdot\cos\theta}{(1+\sin\theta)^2-\cos\theta}$

$\frac{2(1+\sin\theta)-2(1+\sin\theta)\cos}{1+\sin^2\theta+2\sin\theta-\cos^2\theta}$

$\frac{2(1+\sin\theta)(1-\cos\theta)}{2\sin\theta(1+\cos\theta)}$

$= \frac{1-\cos\theta}{\sin\theta} = \frac{1-(1-2\sin^2\frac{\theta}{2})}{2\sin\frac{\theta}{2}\cdot\cos\frac{\theta}{2}}$

$= \frac{\sin\frac{\theta}{2}}{\cos\frac{\theta}{2}} = \tan\frac{\theta}{2}$

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CGL PRE 2018

Q.1 If $5\sqrt{5}x^3 - 81\sqrt{3}y^3 + \sqrt{5}x - 3\sqrt{3}y = Ax^2 + By^2 + Cxy$, then the value of $(6A + B - \sqrt{15}C)$ is:
(a)10 (b)12 (c)9 (d)15

Q.2 If x + y + z = 19, $x^2 + y^2 + z^2 = 133$ and $xz = y^2$, then the difference between z and x is:
(a)6 (b)3 (c)4 (d)5

Q.3 If $x^4 + x^{-4} = 194$, x > 0, then the value of $(x-2)^2$ is:
(a)1 (b)2 (c)6 (d)3

Q.4 If $16x^2 + 9y^2 + 4z^2 = 24(x - y + z) - 61$, then the value of $(xy + 2z)$ is:
(a)1 (b)3 (c)2 (d)5

Q.5 If $\frac{[8(x+y)^3 - 27(x-y)^3]}{5y-x} = Ax^2 + Cy^2 + Bxy$, then the value of $(A + B + C)$ is:
(a)21 (b)16 (c)17 (d)13

Q.6 If $a^2 + b^2 + 64c^2 + 16c + 3 = 2(a + b)$, then the value of $4a^7 + b^7 + 8c^2$ is:
(a)$3\frac{7}{8}$ (b)$4\frac{7}{8}$ (c)$5\frac{1}{8}$ (d)$4\frac{1}{8}$

Q.7 If $x + y = 1$ and $xy(xy - 2) = 12$, then the value of $x^4 + y^4$ is:
(a)19 (b)20 (c)25 (d)23

Q.8 if $ab + bc + ca = 8$ and $a^2 + b^2 + c^2 = 20$, then a possible value of $\frac{1}{2}(a + b + c)[(a - b)^2 + (b - c)^2 + (c - a)^2]$ is:
(a)56 (b)84 (c)72 (d)80

Q.9 If $x^2 - 3x - 1 = 0$, then the value of $(x^2+8x-1)(x^3+x^{-1})^{-1}$ is:
(a) 3/8 (b) 1 (c) 0 (d) 3

Q.10 If $\frac{6x}{2x^2+5x-2} = 1, x > 0$, then the value of $x^3 + \frac{1}{x^3}$ is:
(a)$\frac{3}{8}\sqrt{17}$ (b)$\frac{5}{16}\sqrt{17}$ (c)$\frac{5}{8}\sqrt{17}$ (d)$\frac{3}{4}\sqrt{17}$

Q.11 If $x \neq -1, 2$ and 5, then the simplified value of $\left\{\frac{2(x^3-8)}{x^2-x-2} \times \frac{x^2+2x+1}{x^2-4x-5}\right\} \div \frac{x^2+2x+4}{3x-15}$ is equal to:
(a)$\frac{1}{6}$ (b)$\frac{2}{3}$ (c)6 (d)$\frac{3}{2}$

Q.12 If $x = 2 - \sqrt{3}$ then the value of $x^3 - x^{-3}$ is:
(a)$-30\sqrt{3}$ (b)$30\sqrt{2}$ (c)$30\sqrt{3}$ (d)$-30\sqrt{2}$

CHSL 2018

Q.13 If $(x + y)^{\frac{1}{3}} + (z + y)^{\frac{1}{3}} = -(x + z)^{\frac{1}{3}}$, then $x^3 + y^3 + z^3$ can be expressed as:
(a)$\frac{1}{8}xyz$ (b)$\frac{3}{8}(x + y)(y + z)(z + x)$ (c)$(x + y)(y + z)(z + x)$ (d)$3xyz$

Q. 14 If x is real, and $x^4 - 5x^2 - 1 = 0$, then the value of $(x^6 - 3x^2 + \frac{3}{x^2} - \frac{1}{x^6} + 1)$ is:
(a)110 (b)116 (c)126 (d)96

Q.15 If $8(x + y)^3 - (x - y)^3 = (x + 3y)(Ax^2 + Cy^2 + Bxy)$, then the value of $(A - B - C)$ is:
(a)-6 (b)14 (c)-2 (d)10

CGL TIER II 2018

Q.16 If $\sqrt{86 - 60\sqrt{2}} = a - b\sqrt{2}$, then what will be the value of $\sqrt{a^2 + b^2}$, correct to one decimal place?
(a)8.4 (b)8.2 (c)7.2 (d)7.8

Q.17 Let a, b and c be the fraction such that $a < b < c$. If c is divided be a, the result is $\frac{5}{2}$, which exceeds by b by $\frac{7}{4}$. If $a + b + c = 1\frac{11}{12}$, then $(c - a)$ will be equal to :
(a)$\frac{2}{3}$ (b)$\frac{1}{2}$ (c)$\frac{1}{3}$ (d)$\frac{1}{6}$

Q.18 If $x + \frac{1}{16x} = 3$, then the vlaue of $16x^3 + \frac{1}{256x^3}$ is:
(a)441 (b)414 (c)423 (d)432

Q.19 If $x = \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$ and y is the reciprocal of x, then what is the value of $(x^3 + y^3)$?
(a)504 (b)476 (c)488 (d)472

CPO 2019

Q.20 What is the value of $\frac{0.74 \times 1.23 \times 0.13}{(0.37)^3 + (0.41)^3 - 8(0.39)^3}$?
(a)1 (b)$\frac{1}{3}$ (c)$\frac{-1}{3}$ (d)-1

Q.21 If $a + b + c = 6$ and $a^2 + b^2 + c^2 = 38$, then what is the value of $a(b^2 + c^2) + b(c^2 + a^2) + c(a^2 + b^2) + 3abc$?
(a)-3 (b)-6 (c)3 (d)6

Q.22 The value of $\frac{4.669 \times 4.669 - 9 \times (0.777)^2}{(4.669)^2 + (2.331)^2 + 14(0.667)(2.331)}$ is $(1 - k)$, where k = ?
(a)0.334 (b)1 (c)0.666 (d)2.338

Q.23 The value of $\frac{2.8^3 + 2.2^3}{2.8^2 - 2.8 \times 2.2 + 4.84}$ is:
(a)0.05 (b)0.01 (c)0.5 (d)0.02

Q.24 If $\left(x^3 + \frac{1}{x^3} - k\right)^2 + \left(x + \frac{1}{x} - p\right)^2 = 0$, where k and p are real numbers and $x \neq 0$, the $\frac{k}{p}$ is equal to:
(a)$p^2 + 1$ (b)$p^2 - 3$ (c)$p^2 - 1$ (d)$p^2 + 3$

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$a^6+b^6+3a^2b^2(a^2+b^2) = a^6+b^6-c^6 = -3a^2b^2c^2$ | in Sign

Q.25 If $X^{2a} = Y^{2b} = Z^{2c} \neq 0$ and $x^2 = yz$, then the value of $\frac{ab+bc+ca}{bc}$ is:
(a)3ac (b)3ab (c)3 (d)3bc

Q.26 If $P = \frac{x^4-8x}{x^3-x^2-2x}$ and $Q = \frac{x^2+2x+1}{x^2-4x-5}$ and $R = \frac{2x^2+4x+8}{x-5}$, then $(P \times Q) + R$ is equal to:
(a)2 (b)1 (c)4 (d)$\frac{1}{2}$

CGL PRE 2019

Q.27 If $3^a = 27^b = 81^c$ and $abc = 144$, then the value of $12\left(\frac{1}{a}+\frac{1}{2b}+\frac{1}{5c}\right)$ is:
(a)$\frac{18}{10}$ (b)$\frac{18}{120}$ (c)$\frac{17}{120}$ (d)$\frac{33}{10}$

Q.28 If the value of $(a+b-2)^2+(b+c-5)^2+(c+a-5)^2 = 0$, then the value of $\sqrt{(b+c)^a+(c+a)^b-1}$ is:
(a)1 (b)0 (c)2 (d)3

Q.29 If $b+c = ax, c+a = by$ and $a+b = cz$, then the value of $\frac{1}{9}\left[\frac{1}{x+1}+\frac{1}{y+1}+\frac{1}{z+1}\right]$ is:
(a)$\frac{1}{9}$ (b)0 (c)1 (d)$\frac{1}{3}$

Q.30 Find the product of $(a+b+2c)(a^2+b^2+4c^2-ab-2bc-2ca)$.
(a)$a^3+b^3+8c^3-6abc$
(b) $a^3+b^3+6c^3-6abc$
(c) $a^3+b^3+8c^3-2abc$
(d) $a^3+b^3+8c^3-abc$

Q.31 If $a^2+b^2-c^2 = 0$, then the value of $\frac{2(a^6+b^6-c^6)}{3a^2b^2c^2}$ is:
(a)-2 (b)1 (c)2 (d)0

CHSL 2019

Q.32 If $2x+y = 6$ and $xy = 4$, then find the value of $8x^3+y^3$ is:
(a)16 (b)48 (c)64 (d)72

Q.33 If $2^{x+y-2z} = 8^{8z-5-y}, 5^{4y-6z} = 25^{y+z}, 3^{4x-3z} = 9^{x+z}$, then the value of $2x+3y+5z$ is:
(a)32 (b)44 (c)28 (d)56

Q. 34 The value of $5\sqrt{3}+7\sqrt{2}-\sqrt{6}-\frac{23}{\sqrt{2}+\sqrt{3}+\sqrt{6}}$ is:
(a)12 (b)16 (c)10 (d)0

Q.35 If $x = 2+\sqrt{3}$, then find the value of $x^4-8x^3+16x^2$.
(a)0 (b)1 (c)2 (d)-1

Q.36 If $x = \sqrt[3]{5}+2$, then the value of $x^3-6x^2+12x-12$ is equal to:
(a)1 (b)2 (c)-1 (d)0

Q.37 If $\sqrt{x} = \sqrt{3}-\sqrt{5}$, then the value of $x^2-16x+6$ is:
(a)4 (b)-2 (c)0 (d)2

Q.38 If $A = \frac{1+2x}{1-2x}$ and $B = \frac{1-2x}{1+2x}$, then the value of $\frac{A+B}{A-B}$ is:
(a)$\frac{1}{4x}-x$ (b)$x-\frac{1}{4x}$
(c)$x^2+\frac{1}{4x^2}$ (d)$x+\frac{1}{4x}$

Q.39 If $x+y = 4, xy = 2, y+z = 5, yz = 3, z+x = 6$ and $zx = 4$, then find the value of $x^3+y^3+z^3-3xyz$
(a)151.75 (b)152.75
(c)153.75 / 219.375 both answer can be correct (d)150.75

Q.40 If the value of $\frac{3x\sqrt{y}+2y\sqrt{x}}{3x\sqrt{y}-2y\sqrt{x}}-\frac{3x\sqrt{y}-2y\sqrt{x}}{3x\sqrt{y}+2y\sqrt{x}}$ is same as that of $\sqrt{x}\sqrt{y}$, then which of the following relations between x and y is correct?
(a) $9x+4y = 36$ (b) $9x+4y = 24$
(c) $9x-4y = 24$ (d)$9x-4y = 36$

Q.41 The value of $1+3+5+7+.....(2n-1)$ is:
(a)$n \times n$ (b)$\frac{n(n+1)}{2}$ (c)$\frac{n}{2}$ (d)$(2n-1)^2$

Q.42 If $A = \frac{x-1}{x+1}$, then the value of $A-\frac{1}{A}$ is:
(a)$\frac{-4(2x-1)}{x^2-1}$ (b)$\frac{x^2-1}{-4(2x+1)}$
(c)$-\frac{4x}{x^2-1}$ (d)$\frac{x^2-1}{-4(2x-1)}$

CGL TIER II 2019

Q.43 The value of $\frac{0.0203\times2.92}{0.7\times0.0365\times2.9} \div \frac{(12.12)^2-(8.12)^2}{(0.25)^2+(0.25)(19.99)}$ is:
(a)0.1 (b)0.5 (c)0.01 (d)0.05

Q.44 The value of $\frac{27\times(0.25)^3+125(0.05)^3}{(0.75)^2-0.25\times0.5}$ is:
(a)0.75 (b)0.25 (c)0.5 (d)1

Q.45 If $\frac{8+2\sqrt{3}}{3\sqrt{3}+5} = a\sqrt{3}-b$, then the value of $a+b$ is equal to:
(a)16 (b)15 (c)24 (d)18

Q.46 The value of $\frac{0.325\times0.325+0.175\times0.175+25\times0.00455}{5\times0.0065\times3.25-7\times0.175\times0.025}+\frac{0.5}{1.5}$ is:
(a)3 (b)$\frac{7}{3}$ (c)$\frac{11}{3}$ (d)0

CGL PRE 2020

Q.47 If $x-y = 11$ and $\frac{1}{x}-\frac{1}{y} = \frac{11}{24}$, then what is the value of $x^3-y^3+x^2y^2$?
(a)1331 (b)1105 (c)1115 (d)1307

Q.48 If $16x^2+y^2 = 48$ and $xy = 2, x, y > 0$, then the value of $(64x^3+y^3)$ is:
(a)340 (b)240 (c)320 (d)300

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Q.49 If $a-\frac{12}{a}=1$, where $a>0$, then the value of $a^2+\frac{16}{a^2}$ is:
(a)15 (b)17 (c)11 (d)19

Q.50 If $4x^4-37x^2+9=0, x>\sqrt{\frac{3}{2}}$, then what is the value of $8x^3-\frac{27}{x^3}$?
(a)215 (b)-215 (c)35 (d)-35

Q.51 If $x^8-433x^4+16=0, x>0$, then what is the value of $\left(x+\frac{2}{x}\right)$?
(a)4 (b)7 (c)9 (d)5

Q.52 If $4x^4=5x^2-1, x>\frac{1}{\sqrt{2}}$, then what is the value of $(2x^2-x-1)$?
(a)-2 (b)1 (c)2 (d)0

Q.53 If $a+b+c=0$, then what is the value of $\frac{(b+c)^2}{bc}+\frac{(c+a)^2}{ca}+\frac{(a+b)^2}{ab}$?
(a)-1 (b)-3 (c)3 (d)1

Q.54 Simplify the following expression
$\frac{5(a^6-b^6)^3+5(b^6-c^6)^3+5(c^6-a^6)^3}{2(a^3-b^3)^3+2(b^3-c^3)^3+2(c^3-a^3)^3}$.
(a) $\frac{5}{2}(a^3+b^3)(b^3+c^3)(c^3+a^3)$
(b) $\frac{5}{2}(a^3+b^3)(b^3-c^3)(c^3-a^3)$
(c) $\frac{5}{2}(a^3-b^3)(b^3+c^3)(c^3+a^3)$
(d) $\frac{5}{2}(a^3-b^3)(b^3-c^3)(c^3+a^3)$

CHSL 2020

Q.55 If $x+y+z=13, x^2+y^2+z^2=91$ and $xz=y^2$, then the difference between z and x is:
(a)3 (b)8 (c)9 (d)5

Q.56 The coefficient of x^3y in $(x-2y)\times(5x+y)^3$ is:
(a)75 (b)-150 (c)250 (d)-175

Q.57 If $x^2+4y^2+3z^2+\frac{19}{4}=2\sqrt{3}(x+y+z)$, then the value of $(x-4y+3z)$ is:
(a)$\frac{\sqrt{3}}{3}$ (b)2√3 (c)√3 (d)$\frac{\sqrt{3}}{2}$

Q.58 If $x-y=4$ and $x^3-y^3=316$, then the value of x^4+y^4 is:
(a)2248 (b)2482 (c)2428 (d)2284

Q.59 If $x+\frac{81}{x}=18$ where $x>0$, then the value of $x^2+\frac{162}{x^2}$ is:
(a)78 (b)83 (c)85 (d)81

Q.60 If $a^2+b^2+c^2=576$ and $(ab+bc+ca)=50$, then what is the value of $(a+b+c)$, If $(a+b+c)<0$?
(a)±26 (b)-24 (c)-26 (d)±24

Q.61 If $3x+y=12$ and $xy=9$, then the value of $(3x-y)$ is:
(a)4 (b)5 (c)6 (d)3

Q.62 If $2x+3y+4z=11, 8x^3+27y^3+64z^3=105$ and $xyz=1$, then the value of $4x^2+9y^2+16z^2-6xy-12yz-8xz$ is:
(a)3 (b)4 (c)5 (d)6

Q.63 If $a-\frac{24}{a}=5$, where $a>0$, then the value of $a^2+\frac{64}{a^2}$ is:
(a)45 (b)56 (c)60 (d)65

Q.64 If $3a-b=1$ and $ab=4$,
then the value of $(9a^2-b^2)$ is:
(a)7 (b)8 (c)5 (d)6

Q.65 If $x^4+y^4+x^2y^2=117$ and
$x^2+y^2-xy=3(4+\sqrt{3})$, then the value of (x^2+y^2) will be:
(a)9 (b)6√3 (c)12 (d)13√3

Q.66 If $x^4+\frac{1}{x^4}=6887$, then the positive value of $x-\frac{1}{x}$ is:
(a)12 (b)9 (c)15 (d)8

Q.67 If $3x-2y+3=0$, then what will be the value of $27x^3+54xy+30-8y^3$?
(a)-27 (b)57 (c)-57 (d)3

Q.68 If $a^2+b^2=25, x^2+y^2=17$ and $ax+by=8$, then what is the value of $(ay-bx)$?
(a)33 (b)25 (c)21 (d)19

Q.69 If $(3p-5m)=5$ and $pm=6$, then what is the value of $(9p^2-25m^2)$?
(a)$\pm5\sqrt{385}$ (b)$30\sqrt{10}$
(c)$5\sqrt{385}$ (d)$\pm30\sqrt{10}$

Q.70 If $8a^3+b^3=16$ and $2a+b=4$, then find the value of $16a^4+b^4$.
(a)32 (b)36 (c)28 (d)38

Q.71 If $x^4+\frac{16}{x^4}=27217, x>0$, then the value of $x+\frac{2}{x}$ is:
(a)17 (b)11 (c)15 (d)13

Q.72 If $\left(x+\frac{2}{x}\right)=7$, then what is the value of $\left(2x^2+\frac{8}{x^2}\right)$?
(a)44 (b)94 (c)50 (d)90

Q.73 If $x-y=\frac{7}{4}$ and $\frac{1}{x}-\frac{1}{y}=\frac{14}{3}$, then x^3-y^3 is equal to:
(a)$\frac{433}{64}$ (b)$\frac{433}{32}$ (c)$\frac{217}{64}$ (d)$\frac{217}{32}$

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SSC SELECTION Phase IX

Q.74 If $x^2 + 9y^2 = 40$ and $xy = 4$, where $x > 0$, $y > 0$, then what is the value of $(x^3 + 27y^3)$?
1. 224 2. 800 3. 416 4. 440

Q75. If $2x - \frac{1}{x} = 7, x \neq 0$, then what is the value of $\frac{8x^4+5x^3-1}{8x^4-25x^3-1}$?
(a) $\frac{19}{37}$ (b). $\frac{19}{18}$ (c). $-\frac{1}{5}$ (d). $\frac{13}{12}$

Q76. If $\sqrt{x} - \frac{1}{\sqrt{x}} = \sqrt{14}$, then the value of $\sqrt{x^2 + \frac{1}{x^2}}$ is (correct to one decimal place):
(a). 15.9 (b). 16.6 (c). 17.8 (d). 14.7

Q77. If $a + b = \frac{3}{4}$ and $ab = \frac{1}{8}$, then the value of $a^4 + b^4 + ab^3 + ba^3$ is:
(a) 27/128 (b) 9/256 (c) 27/256 (d) 9/64

Q78. If $\sqrt{x} + \frac{3}{\sqrt{x}} = 4$, then what is the value of $x^2(x^2 - 82)$?
(a) -9 (b) -36 (c) -81 (d) 36

SSC CGL PRE 2021

Q79. If $a + b + c = 6$, $a^2 + b^2 + c^2 = 32$, and $a^3 + b^3 + c^3 = 189$, then the value of $abc - 3$ is:
a) 2 b) 3 c) 1 d) 0

Q80. If $\left(x^2 + \frac{1}{x^2}\right) = 23, x > 0$ what is the value of $\left(x^3 + \frac{1}{x^3}\right) = ?$
a) 140 b) 110 c) -110 d) -140

Q81. If $(x + y)^3 - (x - y)^3 - 3y(2x^2 - 3y^2) = ky^3$, then find the value of k.
a) 10 b) 8 c) 11 d) 10.5

Q82. If $\sqrt{x} - \frac{1}{\sqrt{x}} = \sqrt{5}, x \neq 0$, then what is the value of $\frac{x^4+\frac{1}{x^2}}{x^2+1}$?
a) 46 b) 42 c) 44 d) 48

Q83. If $(4a - 3b) = 1$, $ab = \frac{1}{2}$, where $a > 0$ and $b > 0$, what is the value of $(64a^3 + 27b^3)$?
a) 35 b) 25 c) 15 d) 30

Q84. In a ΔABC, D, E and F are the mid-points of side BC, CA and AB respectively. If BC = 25.6 cm, CA = 18.8 cm and AB = 20.4 cm, what is the perimeter (in cm) of the ΔDEF?
a) 32.4 b) 36.8 c) 34.4 d) 30.6

Q85. If $\left(a + \frac{1}{a} + 3\right)^3 = 216$, where a is a non-zero real number, then find the value of $a^2 + \frac{1}{a^2}$.
a) 7 b) 3 c) 49 d) 47

Q86. If cosec A = sec B, where A and B are acute angles, then what is the value of (A + B)?
a) 0° b) 135° c) 90° d) 45°

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Q87. If $847 \times 385 \times 675 \times 3025 = 3^a 5^b 7^c 11^d$, then the value of ab – cd is:
(a) 7 (b) 5 (c) 1 (d) 4

Q88. If a, b and c are positive number such that $(a^2 + b^2) : (b^2 + c^2) : (c^2 + a^2) = 34 : 61 : 45$, then b-a : c – b : c – a = _____.
(a) 3 : 1 : 2 (b) 3 : 2 : 1
(c) 2 : 1 : 3 (d) 1 : 2 : 3

Q89. If $\frac{22\sqrt{2}}{4\sqrt{2}-\sqrt{(3+\sqrt{5})}} = a + \sqrt{5}\,b$, with a, b > 0, then what is the value of (ab) : (a+b)?
(a) 7 : 8 (b) 8 : 7 (c) 4 : 7 (d) 7 : 4

Q90. If x = 32.5, y = 34.6 and z = 30.9, then the value of $x^3 + y^3 + z^3 - 3xyz$ is 0.98k, where k is equal to:
(a) 1033 (b) 933 (c) 1026 (d) 921

Q91. If $\frac{\sqrt{26-7\sqrt{3}}}{\sqrt{14+5\sqrt{3}}} = \frac{b+a\sqrt{3}}{11}, b > 0$, then what is the value of $\sqrt{(b-a)}$?
(a) 5 (b) 25 (c) 12 (d) 9

CGL MAINS 2022

Q92. What is the value of $\frac{\sqrt{7}+\sqrt{5}}{\sqrt{7}-\sqrt{5}} \div \frac{\sqrt{14}+\sqrt{10}}{\sqrt{14}-\sqrt{10}} + \frac{\sqrt{10}}{\sqrt{5}}$?
a) 2√2 + 1 b) √2 + 2 c) √2 + 1 d) 2√2 + 2

Q93. What is the simplified value of $\frac{(x+y+z)(xy+yz+zx)-xyz}{(x+y)(y+z)(z+x)}$?
a) 1 b) x c) y d) z

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Q94. If $a^4 + b^4 = -a^2b^2$, then $a^6 - b^6 = ?$
a) 0 b) -1 c) 1 d) 2

Q95. If $p = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ and $q = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$, then the value of $\frac{p^2}{q} + \frac{q^2}{p}$ is:
a) 970 b) 1030 c) 930 d) 900

Q96. The sum of the coefficients of x^4y^2 and x^2y^4 in the product of $(-3xy^2 + 1)$ and $7x^3 - 5x^2y - 2y^3 + 3xy^2 + 2x - 5$ is _____.
a) 30 b) 28 c) -30 d) -28

Q97. If $\frac{2x}{5x^2+10x-5} = 1$, then find the value of $\left(x - \frac{1}{x}\right)$
a) -1 b) $\frac{5}{2}$ c) 0 d) $\frac{-8}{5}$

Q98. If x = 459, y = 460, z = 463, then what is the value of $x^3 + y^3 + z^3 - 3xyz$?
a) 19644 b) 16844
c) 18955 d) 17966

Q99. If $(a + b + c) = 17$ and $(a^2 + b^2 + c^2) = 117$, what is the value of $(a - b)^2 + (b - c)^2 + (c - a)^2$?
a) 57 b) 72 c) 72 d) 62

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Q100. If $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=1$, then $\left(\frac{1}{x-1}\right)\left(\frac{1}{x}+\frac{1}{y}\right)+\left(\frac{1}{y-1}\right)\left(\frac{1}{x}+\frac{1}{z}\right)+\left(\frac{1}{x-1}\right)\left(\frac{1}{y}+\frac{1}{z}\right)=?$
a) 1 b) -1 c) 2 d) 0

Q101. If $(x^3+y^3):(x^2-xy+y^2)=3:1$ and $(x^2-y^2):(x+y)=5:6$, then what is 2x: 3y?
a) 36 : 43 b) 38 : 47 c) 45 : 32 d) 46 : 39

Q102. What is the sum of the roots of $x^3-6x^2+11x-6=0$ and $x^3-15x^2+74x-120=0$?
a) 20 b) 19 c) 18 d) 21

Q103. If $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=0$, then
a) $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}=a^2+b^2+c^2$
b) $\frac{1}{a^2-bc}+\frac{1}{b^2-ac}+\frac{1}{c^2-ab}=1$
c) $a^2+b^2+c^2=(a+b+c)^2$
d) ab + bc + ca = 1

Q104. If $\left(a+\frac{1}{a}\right)^2=3$, find the value of $a^{218}+a^{212}+a^{24}+a^{18}$.
a) 0 b) 3√3 c) √3 d) 4

Q105. If $a=\sqrt{7}+\sqrt{8}$ and $b=\sqrt{7}-\sqrt{8}$, then the value of $3a^2-10ab+3b^2$ is:
a) 170 b) 100 c) -70 d) 70

Q106. If $3a^2+\frac{3}{a^2}=54$, then the value of $\frac{a^2+2a-1}{a}$ is:
a) -6, -2 b) 6, -2
c) -6, 2 d) 6, 2

Q107. What is the value of 'a' for the given expression, if $(x+y+z)\neq 0$?
$$\frac{x}{3x+y+z}=\frac{y}{x+3y+z}=\frac{z}{x+y+3z}=2a$$
a) 1/15 b) 1/10 c) 1/5 d) ½

CGL PRE 22

Q108. If $a-b=2$ and $a^3-b^3=80$, then what is the value of ab?
a) 12 b) -24 c) 24 d) -12

Q109. If $\frac{1}{x^2+a^2}=x^2-a^2$, then the value of x is:
a) $(1-a^4)^{1/4}$ b) a c) $(a^4-1)^{1/4}$ d) $(a^4+1)^{1/4}$

Q110. If abc = 5, what is the value of $\left(\frac{1}{1+a+b^{-1}}+\frac{1}{1+b+5c^{-1}}+\frac{1}{1+\frac{c}{5}+a^{-1}}\right)$?
a) 5 b) 1 c) 1/5 d) (a+ b +c)

Q111. If $\frac{2p}{p^2-5p+1}=\frac{1}{10}$, $p\neq 0$, then the value of $\left(p+\frac{1}{p}\right)$ is:
a) 10 b) 25 c) 1 d) 15

Q112. If $x=\frac{\sqrt{5}-\sqrt{4}}{\sqrt{5}+\sqrt{4}}$ and $y=\frac{\sqrt{5}+\sqrt{4}}{\sqrt{5}-\sqrt{4}}$ then the value of $\frac{x^2-xy+y^2}{x^2+xy+y^2}=?$
a) $\frac{361}{363}$ b) $\frac{341}{343}$ c) $\frac{384}{387}$ d) $\frac{321}{323}$

Q113. If $y=1+\sqrt{3}+\sqrt{4}$, then the value of $2y^4-8y^3-6y^2+28y-84$ is:
a) $42\sqrt{3}$ b) $80\sqrt{3}$
c) $20\sqrt{3}$ d) $60\sqrt{3}$

Q114. If $x+\frac{1}{x}=1$, then the value of $x^{12}+x^9x^6+x^3+1$ is:
a) -1 b) 0 c) 1 d) -2

Q115. If $\frac{a}{b}+\frac{b}{a}=1$ and a + b = 2, then the value of a^3+b^3 is:
a) 0 b) 3 c) 1 d) 2

Q116. If $p=7+4\sqrt{3}$, then what is the value of $\frac{p^6+p^4+p^2+1}{p^3}$?
a) 2617 b) 2167 c) 2716 d) 2176

Q117. If $x^2+y^2+z^2=xy+yz+zx$ and x = 1, then find the value of $\frac{10x^4+5y^4+7z^4}{13x^2y^2+6y^2z^2+3z^2x^2}$.
a) 2 b) 0 c) -1 d) 1

Q118. If $\frac{a^2+b^2+c^2-1024}{ab-bc-ca}=-2$ and a + b = 5c, where c > 0, then the value of c is _____.
a) 8 b) 4 c) 12 d) 5

Q119. If $x>0$, and $x^4+\frac{1}{x^4}=2207$, what is the value of $x^7+\frac{1}{x^7}$?
a) 710649 b) 710647 c) 710654 d) 710661

Q120. Simplify: $\frac{x^2+2xy+y^2}{x^3-5x^2}$ if $x+\frac{y^2}{x}=5$.
a) $\frac{5}{y^2}$ b) $\frac{7}{y^2}$ c) $-\frac{5}{y^2}$ d) $-\frac{7}{y^2}$

Q121. If $(a+1)^2+(a+2)^2=16$
then what is the value of $40+12a+4a^2$?
a) 56 b) 62 c) 74 d) 52

Q122. Find the remainder when we divide $3x^4-2x^2+4x-1$ by 2x – 1.
a) 2 b) 3 c) 11/16 d) 15/16

Q123. If $K+\frac{1}{K}+2=0$ and K < 0, then what is the value of $K^{10}+\frac{1}{K^{11}}$?
a) 1 b) 0 c) -1 d) 2

Q124. $3\left[a-\frac{1}{a}\right]+\left[a-\frac{1}{a}\right]^3=?$
a) $a^2-\frac{1}{a^3}$ b) $a^3-\frac{1}{a^3}$
c) $a^3+\frac{1}{a^3}$ d) $a^2-\frac{1}{a^2}$

Q125. Which of the following statement is correct?
1. The value of $100^2-99^2+98^2-97^2+96^2-95^2+94^2-93^2+\ldots\ldots+22^2-21^2$ is 4840.
2. The value of $\left(k^2+\frac{1}{k^2}\right)\left(k-\frac{1}{k}\right)\left(k^4+\frac{1}{k^4}\right)\left(k+\frac{1}{k}\right)\left(k^4-\frac{1}{k^4}\right)$ is $k^{16}-\frac{1}{k^{16}}$.

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a) Neither 1 nor 2 b) Both 1 and 2
c) Only 2 d) Only 1

Q126. If, $\frac{r}{13}+\frac{13}{r}=1$ then the value of r^3 is:
a) -2157 b) 2197 c) 2157 d) -2197

Q127. If $x+\frac{1}{x}=2\cos\Theta$, then $x^3+\frac{1}{x^3}=?$
a) $2\cos 2\Theta$ b) $\cos 3\Theta$
c) $2\cos 3\Theta$ d) $\cos 2\Theta$

Q128. If $8a^3+27b^3=16$ and $2a+3b=4$, then find the value of $16a^4+81b^4$.
a) 26 b) 30 c) 28 d) 32

Q129. If $x=2-2^{1/3}+2^{2/3}$, then find the value of x^3-6x^2+18x.
a) 40 b) 30 c) 45 d) 22

Q130.
Find the value of $\frac{(x-y)^3+(y-z)^3+(z-x^3)}{6(x-y)(y-z)(z-x)}$, where $x \neq y \neq z$.
a) 1/3 b) 1/2 c) 1/9 d) 1/4

Q131. If $mx^m-nx^n=0$ then what is the value of $\frac{1}{x^m+x^n}+\frac{1}{x^m-x^n}$ in terms of xn where x, m, n > 0.
a) $2mn/(x^n(n^2-m^2))$ b) $2mn/(x^n(m^2+n^2))$
c) $2mn/(x^n(m^2-n^2))$ d) $2mn/(x^n(n^2+m^2))$

CPO 22

Q132. If $a-\frac{1}{a-5}=10$, then the value of $(a-5)^3-\frac{1}{(a-5)^3}$ is:
a) 140 b) 70 c) 100 d) 120

Q133. If $x^4+1/x^4=1154$, where x > 0, then what is the value of x^3+1/x^3?
a) 205 b) 214 c) 185 d) 198

Q134. If $\frac{x^8+1}{x^4}=14$, then the value of $\frac{x^{12}+1}{x^6}$ is:
a) 16 b) 14 c) 52 d) 64

Q135. Simplify: $(x+y)^3-(x-y)^3-6y(x^2-y^2)$
a) $8y^3$ b) x^3 c) $8x^3$ d) y^3

Q136. If $x^2+6x+1=0$, then the value of $(x+6)^3+\frac{1}{(x+6)^3}=?$
a) 245 b) 216 c) 186 d) 198

Q137. If $s-\frac{1}{s-8}=20$, then the value of $(s-8)^3-\frac{1}{(s-8)^3}$ is:
a) 1324 b) 1764 c) 1864 d) 1944

Q138. If the equation $k(21x^2+24)+rx+(14x^2-9)=0$ and $k(7x^2+8)+px+(2x^2-3)=0$ have both roots common, then the value of p/r is:
a) $\frac{1}{3}$ b) $\frac{2}{5}$ c) $\frac{4}{3}$ d) $\frac{7}{5}$

Q139. If a, b and c are positive integers such that $a^2+b^2=82$ and $b^2+c^2=65$, then the value of $2a+7b-3c$ is:
a) 2 b) 5 c) 49 d) 1

Q140. If r = 55, then the value of $r(r^2+3r+3)$ is:
a) 105000 b) 176615 c) 175616 d) 175615

Q141. If $x(x-5)=-1$, then the value of $x^3(x^3-110)=?$
a) 0 b) -1 c) 1 d) 2

CGL MAINS 22

Q142 Evaluate the following.
$\sin 25^\circ \sin 65^\circ - \cos 25^\circ \cos 65^\circ$.
a) 4 b) 1 c) 0 d) 40

Q143 If $2^x+3^y=17$ and $2^{x+2}-3^{y+1}=5$, then:
a) x = 1, y = 3 b) x = 3, y = 3
c) x = 3, y = 2 d) x = 1, y = 2

CHSL PRE 2022

Q144 What is the value of $\frac{1+x^2}{1-x}\div\frac{1-x^4}{x-1}\times\frac{x(1-x)}{(1+x)}$?
a) $\frac{-x}{(1+x)^2}$ b) $\frac{-x}{1+2x^2}$
c) $\frac{-x}{1+x}$ d) $\frac{-x}{1+x^2}$

Q145 If x – y = 8 and 8xy = 8, then what is the value of $2x^3-2y^3$?
a) 536 b) 1072 c) 1608 d) 1092

Q146 Which of the following statement is true ?
I. $\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\ldots\ldots\frac{1}{110}<\frac{5}{6}$
II. $\frac{1}{3}+\frac{1}{15}+\frac{1}{35}+\ldots\ldots\frac{1}{143}>\frac{7}{13}$
a) Only I b) Both I and II
c) Only II d) Neither I nor II

Q147 If $a^3+3a^2+3a=63$, then the value of a^2+2a is:
a) 15 b) 19 c) 22 d) 8

Q148 The difference between simple interest on a certain sum at the annual rate of 8 percent for 5 years and 6 years is Rs 26. What is the sum?
a) Rs 325 b) Rs 360 c) Rs 240 d) Rs 290

Q149 What is the value of
$\left(k-\frac{1}{k}\right)\left(k^2+\frac{1}{k^2}\right)\left(k^4+\frac{1}{k^4}\right)\left(k^8+\frac{1}{k^8}\right)\left(k^{16}+\frac{1}{k^{16}}\right)$?
a) $k^{64}-\frac{1}{k^{64}}$ b) $k^{32}-\frac{1}{k^{32}}$
c) $\frac{k^{32}-\frac{1}{k^{32}}}{k-\frac{1}{k}}$ d) $\frac{k^{32}-\frac{1}{k^{32}}}{k+\frac{1}{k}}$

Q150 If $K+\frac{1}{K}=-3$, then what is the value of $\left(\frac{K^6+1}{K^3}\right)+\left(\frac{K^4+1}{K^2}\right)$?
a) 27 b) 29 c) -11 d) -29

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Q151 If (p – q) = 6, (r – q) = 5 and (r – p) = 3, then find the value of $(P^3 + q^3 + r^3 - 3pqr)/(p + q + r)$.
a) 35 b) 45 c) 30 d) 40

Q152 If $A + \frac{1}{A} = -1$, then find the value of $\frac{A^6+A^3-1}{A^9+A^3-1}$.
a) 0 b) 1 c) 2 d) -1

Q153 If $(x + 1)^2 + (x + 2)^2 = 16$, then what is the value of $4x^2 + 12x + 40$?
a) 74 b) 62 c) 56 d) 52

Q154 If a – b = 8 and 4ab = 84, then what is the value of $3a^3 - 3b^3$?
a) 2032 b) 1016 c) 3048 d) 1018

Q155 If $6^x = 3^y = 2^z$, then what is the value of $\frac{1}{y} + \frac{1}{z} - \frac{1}{x}$?
a) 6 b) 1 c) 3 d) 0

Q156 What is the value of $4^2 - 3^2 + 6^2 - 5^2 + 8^2 - 7^2 + \ldots\ldots\ldots 92^2 - 91^2$?
a) 4272 b) 4280 c) 4278 d) 4275

Q157 If x + y + z = 0, then what is the value of $\frac{x}{(yz)^2} + \frac{y}{(xz)^2} + \frac{z}{(xy)^2}$?
a) $\frac{3}{xyz}$ b) xyz c) $\frac{1}{xyz}$ d) $\frac{xyz}{3}$

Q158 If $\frac{K}{k^2-2K+1} = \frac{1}{6}$, then what is the value of $\frac{1}{K^3} + K^3$?
a) 492 b) 488 c) 512 d) 472

Q159 If $m - \frac{1}{m} = 7$, then what is the value of $m^2 + \left(\frac{1}{m^2}\right)$?
a) 51 b) 0 c) 49 d) 53

Q160 If x = -2 and y = 1, then what is the value of $\left(\frac{4}{x} + y\right)\left(\frac{16}{x^2} + y^2 - \frac{4y}{x}\right)$?
a) 5 b) -5 c) -7 d) 7

ICAR & Selection Phase XI

Q161 Let $x = \sqrt{35 + 5\sqrt{13}} - \sqrt{35 - 5\sqrt{13}}$ and $y = \frac{3-\sqrt{10}}{3+\sqrt{10}}$. If $x - y = A + B\sqrt{10}$, then what is the value of (A – B)?
1. 31 2. 25 3. 29 4. 24

Q162 If $\frac{2x}{x+2} + \frac{1}{2x+4} - \frac{12-x}{2x^2+4x} = a + \frac{b}{x}$, where a and b are integers, then the value of ab = _____.
1. -3 2. -6 3. 3 4. 6

Q163 If $x > 1$, and $x^2 + \frac{1}{x^2} = 2\sqrt{5}$, what is the value of $x^4 - \frac{1}{x^4}$?
1. $4\sqrt{5}$ 2. $8\sqrt{6}$ 3. $4\sqrt{30}$ 4. $8\sqrt{5}$

Q164 If 2a + b = 10 and 2ab = 9, then one of the values of 2a – b is:
1. 10 2. 4 3. 8 4. 6

CGL PRE 23

Q165 What is the value of $64x^3 + 38x^2y + 20xy^2 + y^3$, when x = 3 and y = -4?
1) 1236 2) 488 3) 536 4) 1256

Q166 If x > 0 and $x^4 + \frac{1}{x^4} = 254$ then the value of $x^5 + \frac{1}{x^5}$?
1. 726√2 2. 717√2 3. 723√2 4. 720√2

Q167 Find the value of these expression?
Y + 2x – [(y – (y – x + y) – (x + y) + y] – 2y
1. Y 2. 2x 3. -2x 4. –y

Q168 Find the sum of $3 + 3^2 + 3^3 + \ldots + 3^8$?
1. 6561 2. 9840 3. 3280 4. 6560

Q169 If $\left(x - \frac{1}{x}\right) = \sqrt{6}$ and x > 1, then find the value of $\left(x^8 - \frac{1}{x^8}\right)$?
1. $992\sqrt{15}$ 2. $1024\sqrt{15}$
3. $1012\sqrt{15}$ 4. $998\sqrt{15}$

Q170 If $a + \frac{1}{a} = 7$, then $a^5 + \frac{1}{a^5}$ is equal to which of the following:
1. 13127 2. 14527 3. 15127 4. 11512

Q171 If $a^2 + b^2 + c^2 = ab + bc + ac$, then the value of $\frac{11a^4+13b^4+17c^4}{17a^2b^2+9b^2c^2+15c^2a^2}$ is:
1. 1 2. 2 3. 11 4. 4

Q172 If $\left(x + \frac{1}{x}\right) = 5$, and x > 1, what is the value of $\left(x^8 - \frac{1}{x^8}\right)$?
1. $60605\sqrt{21}$ 2. $60615\sqrt{21}$
3. $60705\sqrt{21}$ 4. $60725\sqrt{21}$

Q173 A varies directly as (B + 18) and A = 108 when B = 36. Find the value of A when B = 68.
1. 75 2. 86 3. 127 4. 172

Q174 If $\left(x - \frac{1}{x}\right) = 2\sqrt{2}$, and x > 1, what is the value of $\left(x^6 - \frac{1}{x^6}\right)$?
1. $372\sqrt{6}$ 2. $384\sqrt{6}$
3. $396\sqrt{6}$ 4. $420\sqrt{6}$

Q175 Simplify $\frac{1}{2+2p} + \frac{1}{2+2q} + \frac{1}{2+2r}$, where $p = \frac{x}{y+z}$, if $q = \frac{y}{z+x}$ and $r = \frac{z}{x+y}$.
1. 1 2. x + y + z 3. 2 4. ½

Q176 If $x^2 - 15x + 1 = 0$, what is the value of $x^4 - 223x^2 + 6$?
1. 9 2. 5 3. 6 4. 0

Q177 What value of 'y' will satisfy the following equation?
$\frac{3y}{1+\frac{1}{1+\frac{y}{1-y}}} = 2$
1. $\frac{2}{3}$ 2. $\frac{5}{4}$ 3. $\frac{4}{5}$ 4. $\frac{3}{2}$

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Q178 If $p + q + r = pqr = \frac{1}{p} + \frac{1}{q} + \frac{1}{r} = 1$, then find the $p^3 + q^3 + r^3$.
1. 1 2. -1 3. 5 4. -5

Q179 If $x^2 - \frac{1}{x^2} = 4\sqrt{2}$, what is the value of $x^4 - \frac{1}{x^4}$?
1. $16\sqrt{2}$ 2. $8\sqrt{2}$ 3. $24\sqrt{2}$ 4. $32\sqrt{2}$

CHSL PRE 23

Q180. If $x + \frac{1}{x} = 2$, then the value of $x^{11} + \frac{1}{x^{20}}$ is:
1. 1 2. 0 3. 7 4. 2

Q181 If $ax + by = 1$ and $bx + ay = \frac{2ab}{a^2+b^2}$, then the value of x (in terms of a and b) is:
1. $\frac{2a}{a^2+b^2}$ 2. $\frac{a}{a^2+b^2}$ 3. $\frac{b}{a^2+b^2}$ 4. $\frac{2b}{a^2+b^2}$

Q182. If $4x^2 + y^2 = 40$ and $xy = 6$, then the value of $2x - y$ is:
1. 4 2. 1 3. 2 4. 3

Q183. If $x^2 - 3.2x + 1 = 0$ and $x > 1$, the value of $\left(x^2 - \frac{1}{x^2}\right)$ is:
1. $16.8\sqrt{0.32}$ 2. $12.8\sqrt{0.39}$
3. $16.8\sqrt{0.39}$ 4. $12.8\sqrt{0.32}$

Q184. If $(a + b + c) = 17$, and $(a^2 + b^2 + c^2) = 115$, find the value of $(a + b)^2 + (b + c)^2 + (c + a)^2$.
1. 402 2. 404 3. 408 4. 394

Q185. If $P^2 - 4p - 1 = 0$, then the value of $p^2 + 3p + \frac{1}{p^2} - \frac{3}{p}$ is:
1. 30 2. 65 3. 50 4. 40

Q186. If $a^2 + b^2 + c^2 = ab + bc + ca$, then the value of $\frac{11a^4+13b^4+15c^4}{16a^2b^2+19b^2c^2+17c^2a^2}$ is:
1. $1\frac{3}{4}$ 2. $\frac{1}{4}$ 3. $1\frac{1}{3}$ 4. $\frac{3}{4}$

Q187. Which of the following expressions is equal to the expression $\frac{x^2-3x+2}{x^2-4}$?
1. $\frac{x+1}{x-2}$ 2. $\frac{x-1}{x+2}$ 3. $\frac{x+1}{x+2}$ 4. $\frac{x-1}{x-2}$

Q188. If $x + \frac{2}{x} = 1$, then the value of $\frac{x^2+7x+2}{x^2+13x+2}$ is:
1. 3/7 2. 5/7 3. 2/7 4. 4/7

Q189. Find the value of $(a^3 + b^3 + c^3 - 3abc)$, where a = 335, b = 215 and c = 180.
1. 14472250 2. 15421320
3. 14502230 4. 15452630

Q190. Simplify:
$\frac{(612+388)^2+(612-388)^2}{(612\times612)+(388\times388)} = ?$
1. 4 2. 2 3. 3 4. 1

Q191. If $a = \cot A + \cos A$ and $b = \cot A - \cos A$, then find the value of $a^2 - b^2 - 4\sqrt{ab}$.
1. 0 2. 1 3. -1 4. -4

Q192. Simplify the given expression:
$\frac{0.09\times0.09+0.04\times0.04+0.16\times0.16+2\times0.09\times0.04+2\times0.04\times0.16+2\times0.09\times0.16}{0.3\times0.3+0.2\times0.2+0.4\times0.4}$
1. 0.29 2. 0.32 3. 0.38 4. 0.24

Q193. Simplify the following expression:
$0.01+0.68\times0.68+0.22\times0.22+0.044+0.136+0.44\times0.68$
1. 0.69 2. 0.8 3. 1 4. 0.9

Q194. If $\sqrt{\frac{a}{b}} = \frac{8}{3} + \sqrt{\frac{b}{a}}$ and $(a + b) = 30$, then what is the value of ab?
1. 36 2. 64 3. 81 4. 28

Q195. If $2x + 3y = 9$, and $xy = 3$, what is $8x^3 + 27y^3$?
1. 234 2. 243 3. 235 4. 244

Q196. Simplify the expression :
$\frac{(u-v)^3+(v-w)^3+(w-u)^3}{(u^2-v^2)^3+(v^2-w^2)^3+(w^2-u^2)^3}$
1. $\frac{1}{(u+v)(v+w)(w+u)}$
2. 0
3. $\frac{3}{(u+v)(v+w)(w+u)}$
4. 1

Q197. If $\left(x + \frac{1}{x}\right) = 5\sqrt{2}$, and $x > 1$, what is the value of $\left(x^6 - \frac{1}{x^6}\right)$?
1. $23060\sqrt{23}$ 2. $23030\sqrt{23}$
3. $22960\sqrt{23}$ 4. $22970\sqrt{23}$

Q198. If $a = \frac{1}{a-\sqrt{6}}$ $(a > 0)$, then the value of $\left(a + \frac{1}{a}\right)$ is:
1. $\sqrt{6}$ 2. $\sqrt{7}$ 3. $\sqrt{10}$ 4. $\sqrt{15}$

Q199. If $p + q + r = 0$, then what is the simplified value of the expression $\left(\frac{p^2}{p^2-qr} + \frac{q^2}{q^2-pr} + \frac{r^2}{r^2-pq}\right)$?
1. 1 2. 2 3. 0 4. -1

Q200. For what positive value of k, the equation $3x^2 + 2kx + 3 = 0$ has real and equal roots?
1. 9 2. 12 3. 3 4. 1

Q201. Simplify:
$\frac{(1-m)^3+(m-n)^3+(n-1)^3}{12(1-m)(m-n)(n-1)} = ?$
1. ½ 2. 2/3 3. 3/2 4. ¼

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Q202. If $\left(y-\frac{1}{y}\right)=-9$, what will be the value of $\left(y^5-\frac{1}{y^5}\right)$?
1. -62757 2. -62748 3. -59049 4. -62739

Q203. Simplify the following expression.
$(a+b+c)^2-(a-b+c)^2+4ac$
1. 4(bc + ac) 2. 4(ab + bc + ac)
3. 2(ab + bc + ac) 4. 4(bc + ab)

Q204. If $x^2-11x+1=0$, what is the value of $x^8-14159x^4+11$?
1. 11 2. 12 3. 10 4. 9

Q205. If $x^2-5\sqrt{5}x+1=0$, and $x>0$, what is the value of $\left(x^3-\frac{1}{x^3}\right)$?
1. 1331 2. 1296 3. 1364 4. 1244

Q206. If $1+m+n=0$, then what will be the value of $\left(\frac{l^2}{mn}+\frac{m^2}{nl}+\frac{n^2}{lm}\right)^2$?
1. 16 2. 9 3. 1 4. 4

Q207. If $x^2-\sqrt{9.76}x+1=0$ and $x>1$, the value of $\left(x^3-\frac{1}{x^3}\right)$ is:
1. 24.024 2. 21.042 3. 21.024 4. 24.042

SELECTION PHASE XII

Q208. If $x^2+y^2+z^2=xy+yz+zx$, then the value of $\left(\frac{17x^4+9y^4+16z^4}{8x^2y^2+6y^2z^2+10z^2x^2}\right)$ is:
a) 1.75 b) 3.25 c) 2.00 d) 2.50

Q209. Find the sum of $3+3^2+3^3+.....+3^8$.
a) 9840 b) 6560 c) 3280 d) 6561

Q210. If $\left(x-\frac{1}{x-1}\right)=3$, then the value of $(x-1)^2+\frac{1}{(x-1)^2}$ is:
a) 6 b) 4 c) 3 d) 5

Q211. If $x^3=184+y^3$ and $x=4+y$, then the value of $(x+y)$ is given that $x>0$ and $y>0$):
a) $2\sqrt{14}$ b) $2\sqrt{11}$ c) $-2\sqrt{14}$ d) $-2\sqrt{11}$

Q212. Which of the following statements is true? Ans
a) The sum of deviations of the items from the arithmetic mean is always one.
b) The sum of the squared deviations of the items from the arithmetic mean is maximum.
c) Arithmetic mean is the sum of deviations from the mid value.
d) The sum of deviations of the items from the arithmetic mean is always zero.

CPO 2024

Q213. The value of $1+\cfrac{1}{1+\cfrac{1}{5+\cfrac{1}{2+\frac{1}{3}}}}$?
a) $1\frac{13}{45}$ b) $2\frac{17}{45}$ c) $2\frac{11}{45}$ d) $1\frac{38}{45}$

Q214. If x = 11, then the value of $(x^5-12x^4+12x^3+12x-1)$ is:
a) 10 b) 8 c) 9 d) 14

Q215. Determine the value of the product $(4a+3b)(16a^2-12ab+9b^2)$ for a = 2 and b = 3.
a) 1131 b) 1141 c) 1231 d) 1241

CHSL 2024

Q216. If $2^3:8^{5.06}::8^{-4.06}:X$, find the value of x.
a) $\frac{1}{2^2}$ b) 1 c) 2^3 d) 0

CGL 2024

Q217. Find the value of 'a' and 'b' for which the system of equations $3x+y=3$ and $(a-b)x+(a+b)y=3a+b-3$ has infinite solutions.
a) $a=3, b=-\frac{2}{3}$ b) $a=\frac{3}{2}, b=2$
c) $a=3, b=-\frac{3}{2}$ d) $a=2, b=-\frac{3}{2}$

DQ218. Which of the following fractions is the largest?
$\frac{3}{7}, \frac{7}{53}, \frac{41}{80}, \frac{29}{79}$
a) $\frac{29}{79}$ b) $\frac{7}{53}$ c) $\frac{3}{7}$ d) $\frac{41}{80}$

Q219. If $\left(a+\frac{1}{a}\right)=7\sqrt{3}$, then what is the value of (a^6+a^{-6})?
a) 3048190 b) 3048542
c) 3048132 d) 3048625

Q220. If $(77^{77}+77)$ is divided by 78, then the remainder will be:
a) 76 b) 77 c) 78 d) 1

Q221. If $x^2+y^2=280$ and $xy=120$, then find the value of $\frac{x-y}{x+y}$.
a) $\frac{1}{\sqrt{13}}$ b) $\sqrt{15}$ c) $\sqrt{13}$ d) $\frac{1}{\sqrt{15}}$

Q222. 'x' varies directly with the cube of 'y', and inversely with the square of 'z'. If x = 1/36 when y = 2 and z = 3, then what is the value of 800x when y = 3 and z = 5?
a) 9/8000 b) 27 c) 800/9

Q223. If x, y and z are positive numbers and x + y + z = 1, then the least value of $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}$ is:
a) 5 b) 11 c) 7 d) 9

Q224. $\frac{x^3+15x^2+75x+125}{x^2-25}(x-5)$
a) x^2+25 b) $x^2+10x+25$
c) $x^2+5x+25$ d) x^2-25

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Q225. If $2a - b = 3$ and $8a^3 - b^3 = 999$, then find the value of $4a^2 - b^2$?

a) 61 b) 67 c) 63 d) 65

Q226. Aman has certain number of notes of ₹ ination Rs 20 and Rs 10 which amount to Rs 390. If the numbers of notes of each kind are interchanged, then the new amount is Rs 90 less than before. Find the number of notes of Rs 20 denomination.

a) 16 b) 12 c) 15 d) 14

Q227. If $x = 7 - 4\sqrt{3}$, then find the value of $\left(x^2 + \frac{1}{x^2}\right)$.

a) 188 b) 194 c) 186 d) 196

Q228. If $a^2 + b^2 + c^2 = 2(a + c - 1)$, then the value of $a^3 + b^3 + c^3 = ?$

a) 1 b) 2 c) 4 d) 0

Answer Key

1	B	2	D	3	D
4	D	5	B	6	C
7	C	8	C	9	B
10	C	11	C	12	A
13	B	14	C	15	C
16	D	17	B	18	C
19	C	20	C	21	B
22	A	23	C	24	B
25	C	26	D	27	D
28	D	29	A	30	A
31	A	32	D	33	B
34	A	35	B	36	A
37	D	38	D	39	C
40	C	41	A	42	C
43	D	44	D	45	D
46	C	47	C	48	C
49	B	50	A	51	D
52	D	53	C	54	A
55	B	56	D	57	C
58	B	59	B	60	C
61	C	62	A	63	D
64	A	65	C	66	B
67	D	68	D	69	A
70	A	71	D	72	D
73	C	74	A	75	D
76	A	77	C	78	C
79	D	80	B	81	C
82	A	83	A	84	A
85	A	86	C	87	B
88	C	89	A	90	A
91	A	92	C	93	A
94	A	95	A	96	C
97	D	98	D	99	D
100	A	101	D	102	D
103	C	104	A	105	B
106	B	107	B	108	A
109	D	110	B	111	B
112	D	113	A	114	C
115	A	116	C	117	D
118	A	119	B	120	D
121	B	122	C	123	B
124	B	125	D	126	D
127	C	128	D	129	D
130	B	131	A	132	A
133	D	134	C	135	A
136	D	137	B	138	A
139	D	140	D	141	B
142	C	143	C	144	A
145	B	146	D	147	A
148	A	149	D	150	C
151	A	152	B	153	B
154	C	155	D	156	D
157	A	158	B	159	A
160	C	161	D	162	B
163	D	164	C	165	D
166	B	167	B	168	B
169	A	170	C	171	A
172	A	173	D	174	C
175	A	176	B	177	C
178	A	179	C	180	D
181	B	182	A	183	B
184	B	185	A	186	D
187	B	188	D	189	A
190	B	191	A	192	A
193	C	194	C	195	B
196	A	197	B	198	C
199	B	200	C	201	D
202	D	203	B	204	C
205	C	206	B	207	C
208	A	209	A	210	A
211	A	212	C	213	D
214	A	215	D	216	B
217	C	218	D	219	A
220	A	221	A	222	B
223	D	224	B	225	C
226	A	227	B	228	B

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1.

$$\frac{5\sqrt{5}x^3 - 81\sqrt{3}y^3}{\sqrt{5}x - 3\sqrt{3}y} = \frac{(\sqrt{5}x - 3\sqrt{3}y)(5x^2 + 27y^2 + 3\sqrt{15}xy)}{\sqrt{5}x - 3\sqrt{3}y}$$

$$\left[\because a^3 - b^3 = (a-b)(a^2+b^2+ab)\right]$$

$$5x^2 + 27y^2 + 3\sqrt{15}xy = Ax^2 + By^2 + Cxy$$

Comparing both side,

$A = 5, \quad B = 27, \quad C = 3\sqrt{15}$

Hence,

$(6A + 8 - \sqrt{16}C) = (6\times5) + (27) - (3\sqrt{3}\times\sqrt{15})$

$= \underline{12 \text{ Ans}}$

2.

$x + y + z = 19, \quad x^2 + y^2 + z^2 = 133, \quad xz = y^2$

by hit & trial,

$x = 9, \quad y = 6, \quad z = 4$ (Satisfied)

Hence,

Difference $= 9 - 4 = \underline{5 \text{ Ans}}$

3.

$x^4 + \frac{1}{x^4} = 194$

$x^2 + \frac{1}{x^2} = 14$

$x + \frac{1}{x} = 4$

$\downarrow$

$x^2 - 4x = -1$

$(x-2)^2 = x^2 + 4 - 4x$

$\downarrow$

$-1 + 4 = \underline{3 \text{ Ans}}$

4.

$16x^2 + 9y^2 + 4z^2 = 24(x - y + z) - 61$

$x = \frac{12}{16} = \frac{3}{4}, \quad y = \frac{-12}{9} = \frac{-4}{3}, \quad z = \frac{12}{4} = 3$

$(xy + 2z) = \left(\frac{3}{4}\times\frac{-4}{3} + 2\times3\right) = \underline{5 \text{ Ans}}$

5.

$$\frac{[8(x+y)^3 - 27(x-y)^3]}{5y - x} = \frac{[(2x+2y)^3 - (3x-3y)^3]}{5y - x}$$

$$= \frac{(2x+2y-3x+3y)[4x^2+4y^2+8xy+9x^2+9y^2-18xy+6x^2-6y^2]}{(5y-x)}$$

$$= \frac{(5y-x)[(19x^2+7y^2-10xy)]}{(5y-x)} = Ax^2 + cy^2 + Bxy$$

$A = 19, \quad B = -10, \quad C = 7$

$(A + B + C) = (19 - 10 + 7) = \underline{16 \text{ Ans}}$

6.

$a^2 + b^2 + 64c^2 + 16c + 3 = 2(a+b)$

$a = \frac{1}{1}, \quad b = \frac{1}{1}, \quad c = \frac{-1}{8}$

$4a^7 + b^7 + 8c^2 = 4\times1 + 1 + 8\times\frac{1}{64} = \underline{5\frac{1}{8} \text{ Ans}}$

7.

If $x + y = 1$ and $xy(xy - 2) = 12$

$\downarrow$ square

$x^2 + y^2 + 2xy = 1$

$x^2 + y^2 = 1 - 2xy$

Squaring both side

$x^4 + y^4 + 2x^2y^2 = 1 + 4x^2y^2 - 4xy$

$x^4 + y^4 = 1 + 2x^2y^2 - 4xy$

$x^4 + y^4 = 1 + 2xy(xy - 2)$

$x^4 + y^4 = 1 + 2\times12 = \underline{25 \text{ Ans}}$

8.

$ab + bc + ca = 8$ and $a^2 + b^2 + c^2 = 20$

Two equation, Three Variable Put $c = 0$

$ab = 8, \quad a^2 + b^2 = 20$

4×2 ✓ $\quad 16 + 4$ ✓

$\frac{1}{2}(a+b+c)\left[(a-b)^2 + (b-c)^2 + (c-a)^2\right]$

$\Rightarrow \frac{1}{2}(a+b)\left[(a-b)^2 + b^2 + a^2\right]$

$\frac{1}{2}\times6\left[4 + 4 + 16\right] = \underline{72 \text{ Ans}}$

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9.

$x^2 - 3x - 1 = 0$ | $(x^3 + 8x - 1)/(x^3 + \frac{1}{x})$

$x - \frac{1}{x} = 3$ | $* \frac{x(x - \frac{1}{x} + 8)}{x(x^2 + \frac{1}{x^2})} = \frac{3+8}{11} = \underline{1 \text{ Ans}}$

$x^2 + \frac{1}{x^2} = 11$

10.

$\frac{6x}{2x^2 + 5x - 2} = 1 \Rightarrow x - \frac{1}{x} = \frac{1}{2}$

$x + \frac{1}{x} = \sqrt{\left(\frac{1}{2}\right)^2 + 4} = \frac{\sqrt{17}}{2}$

$x^3 + \frac{1}{x^3} = \frac{17\sqrt{17}}{8} - \frac{3\sqrt{17}}{2} = \underline{\frac{5\sqrt{17}}{8} \text{ Ans}}$

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11.

Put $x = 0$

$\frac{2(-8)}{-2}\times\frac{1}{-5}\times\frac{-15}{4} = \underline{6 \text{ Ans}}$

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12.

$x = 2-\sqrt{3}$, $\frac{1}{x} = 2+\sqrt{3}$

$x - \frac{1}{x} = -2\sqrt{3}$

$x^3 - \frac{1}{x^3} = -24\sqrt{3} - 6\sqrt{3} = \underline{-30\sqrt{3}}$ Ans

13.

$(x+y)^{1/3} + (y+z)^{1/3} + (z+x)^{1/3} = 0$

If $a+b+c=0$, $a^3+b^3+c^3 = 3abc$

$\Rightarrow (x+y)+(y+z)+(z+x) = 3(x+y)^{1/3}(y+z)^{1/3}(z+x)^{1/3}$

$(x+y+z)^3 = \left[\frac{3}{2}(x+y)^{1/3}(y+z)^{1/3}(z+x)^{1/3}\right]^3$

$\Rightarrow x^3+y^3+z^3+3(x+y)(y+z)(z+x) = \frac{27}{8}(x+y)(y+z)(z+x)$

$x^3+y^3+z^3 = \frac{3}{8}(x+y)(y+z)(z+x)$ Ans

14.

$x^4 - 5x^2 - 1 = 0$

$x^2 - \frac{1}{x^2} = 5$

$x^6 - \frac{1}{x^6} = 140$

$x^6 - 3x^2 + \frac{3}{x^2} - \frac{1}{x^6} + 1$

$= (x^6 - \frac{1}{x^6}) - (x^2 - \frac{1}{x^2})3 + 1$

$= 140 - 15 + 1 = \underline{126}$ Ans

15.

Put $x=1$, $y=-1$

$-8 = (-2)[A+C-8]$

$A-B+C = 4$

Now, Put $x=0$, $y=1$

$8+1 = 3(C)$, $C=3$

$A-B-C = 4-3\times 2 = \underline{-2}$ Ans

16.

$\sqrt{86 - 60\sqrt{2}} = \sqrt{86 - 2\times 5\sqrt{2}\times 6}$

$= (6-5\sqrt{2})$

$\sqrt{a^2+b^2} = \sqrt{36+25} = 7.8$ Ans

17.

$\frac{c}{a} = \frac{5x}{2x}$, $b = \frac{10}{4} - \frac{7}{4} = \frac{3}{4}$

$a+c = \frac{23}{12} - \frac{9}{12} = \frac{7}{6}$

$7x \longrightarrow \frac{7}{6}$

$x \longrightarrow 1/6$

$c-a = 3x$

$= 1/2$

18.

$4x + \frac{1}{4x} = 12$

$64x^3 + \frac{1}{64x^3} = 1728 - 36$

$= 1692$

$16x^3 + \frac{1}{256x^3} = 423$

19.

$x = \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$, $y = \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$

$x+y = \frac{2\cdot(a+b)}{(a-b)} \Rightarrow \frac{2\times 8}{2} = 8$

$x^3+y^3 = K^3 - 3K = 512 - 24 = 488$ Ans

20.

$\frac{3abc}{a^3+b^3+c^3}$ if $a+b+c=0$

$a^3+b^3+c^3 = 3abc$

$\Rightarrow 1$ Ans ✗ Ans → $-1/3$

21.

$a(b^2+c^2) + b(c^2+a^2) + c(a^2+b^2) + 3abc$

$= (a+b+c)(ab+bc+ca)$

$= 6\times -1 \Rightarrow -6$ Ans

22.

$\frac{a^2-b^2}{a^2+b^2+2ab} = \frac{a-b}{a+b}$

$\frac{4.669 - 2.331}{4.669 + 2.331} = \frac{2.338}{7} = 0.334$

$1-K = 0.334$

$K = 0.666$ Ans

23.

$\frac{2\cdot 8^3 + 2\cdot 2^3}{28^2 - 28\times 22 + 484} \Rightarrow \frac{1}{1000} \frac{28^3+22^3}{(28^2-28\times 22+22^2)}$

$= \frac{50}{1000} = 0.05$ Ans

24.

$x^3 + \frac{1}{x^3} = K$, $x + \frac{1}{x} = P$

$x^2 + \frac{1}{x^2} = P^2 - 2$

$x^3 + \frac{1}{x^3} = P^2 - 3P$

$K = P^2 - 3P$

$\frac{K}{P} = P^2 - 3$ Ans

25.

$x^{2a} = y^{2b} = z^{2c} = K$

$x^2 = K^{1/a}$, $y = K^{1/2b}$, $z = K^{1/2c}$

given $x^2 = yz$

$K^{1/a} = K^{1/2b} \cdot K^{1/2c}$

$K^{1/a} = K^{\frac{b+c}{2bc}}$ (as compare)

$\frac{1}{a} = \frac{b+c}{2bc}$

$ab+bc+ca = 3bc$ Ans ✗

Ans → 3

26.

Put $x=1$

$P = \frac{7}{2}$, $Q = \frac{-1}{2}$, $R = \frac{-7}{2}$

$\frac{P\times Q}{R} = \frac{-7}{4} \times \frac{-2}{7} = \frac{1}{2}$ Ans

27.

$3^a = 3^{3b} = 3^{4c}$

$a = 3b = 4c$

$a:b:c = 12:4:3$

$a=12$, $b=4$, $c=3$

$\Rightarrow 12\left(\frac{1}{12} + \frac{1}{8} + \frac{1}{15}\right) = \frac{33}{10}$

28.

$a+b=2$, $b+c=5$, $c+a=5$

$a+b+c = \frac{12}{2} = 6$

$a=1$, $b=1$, $c=4$

$\sqrt{(b+c)^a + (c+a)^b - 1} = \sqrt{5+5-1}$

$= 3$ Ans

29.

$a+b+c = ax+a$

$x+1 = \frac{a+b+c}{a}$

Similarly, $y+1 = \frac{a+b+c}{b}$

$z+1 = \frac{a+b+c}{c}$

$\frac{1}{9}\left(\frac{a+b+c}{a+b+c}\right) = \frac{1}{9}$ Ans

30.

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As we know,
$a^3+b^3+c^3-3abc = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$
Similarly,
$a^3+b^3+(2a)^3 - 3\times a\times b\times 2c$
$= a^3+b^3+8c^3-6abc$ Ans

31.

$a+b+c = 0,\ a^3+b^3+c^3 = 3abc$
Similarly, $a^6+b^6-c^6 = -3a^2b^2c^2$
So, $\frac{-2\times 3\times a^2b^2c^2}{3\times a^2b^2c^2} = -2$ Ans

32.

$(2x+y)^2 = 36$
$4x^2+y^2 = 36-4\times 4 = 20$
$8x^3+y^3 = (2x+y)(4x^2+y^2-2xy)$
$= 6(20-8) = 72$ Ans

33.

$2^{x+y-2z} = 2^{24z-15-3y}$
$x+y-2z = 24z-15-3y$
$x+4y-26z = 15$ —(i)
&
$4y-6z = 2y+2z$
$2y = 8z$ —(ii)
&
$4x-3z = 2x+2z$
$2x = 5z$ —(iii)
Put (iii) in (ii)
$10z-2y = 8z \Rightarrow y = z$ —(iv)
Put (iii) & (iv) in (i)
$2.5z+16z-26z = -15$
$z = 2,\ y = 8,\ x = 5$
$2x+3y+5z = 44$ Ans

34.

$5\sqrt{5}+7\sqrt{2}-\sqrt{6}-\frac{28}{\sqrt{2}+\sqrt{3}+\sqrt{6}}$
$\frac{5\sqrt{6}+15+15\sqrt{2}+14+7\sqrt{6}+14\sqrt{3}-2\sqrt{3}-3\sqrt{2}-6-28}{\sqrt{2}+\sqrt{3}+\sqrt{6}}$
$= \frac{12\sqrt{6}+12\sqrt{2}+12\sqrt{3}}{\sqrt{6}+\sqrt{2}+\sqrt{3}} = 12$ Ans

35.

$x = 2+\sqrt{3}$
$x^2(x^2-8x+16)$
$x^2(x-4)^2$
$(7+4\sqrt{3})(7-4\sqrt{3}) = 1$ Ans

36.

$x^3-6x^2+12x-12$
$(x-2)^3-4$
$8-4 = 4$ Ans

37.

$x = 8-2\sqrt{15}$
$x^2-16x+6$
$(x-8)^2-58 = 60-58$
$= 2$ Ans

38.

$\frac{A+B}{A-B} = \frac{(1+2x)^2+(1-2x)^2}{(1+2x)^2-(1-2x)^2}$
$= \frac{2+8x^2-1}{8x} = x+\frac{1}{4x}$

39.

$x+y+z = \frac{15}{2}$
$xy+yz+2x = 9$
$x^3+y^3+z^3-3xyz = (x+y+z)\left[(x+y+z)^2-3(xy+yz+zx)\right]$
$= \frac{15}{2}\left(\frac{225}{4}-27\right)$
$= 393.75$ Ans

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40.

$\frac{2\times 2\times 3x\sqrt{y}\times 2y\sqrt{z}}{(3x\sqrt{y})^2-(2y\sqrt{z})^2} = \sqrt{xy}$
$\frac{24xy\sqrt{xy}}{xy(9x-4y)} = \sqrt{xy}$
$9x-4y = 24$ Ans

41.

$\text{Sum} = \frac{2n-1}{2}\left\{2\times 1+(2n-2)\times 2\right\}$
$= (2n-1)^2$

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42.

$A-\frac{1}{A} = \frac{x-1}{x+1}-\frac{x+1}{x-1} = \frac{-4x}{x^2-1}$

43.

$\frac{203\times 292}{7\times 365\times 29}\times\frac{0.28\times 20.2}{4\times 20.2}$
$= 0.05$ Ans
95

44.

$\frac{(0.25)^3\times 28}{0.25\times 1.75}$
$= 4\times 0.25 = 1$

45.

$\frac{(8+2\sqrt{3})(3\sqrt{3}-5)}{2} = a\sqrt{3}-b$
$\frac{14\sqrt{3}-22}{2} = a\sqrt{3}-b$
$a = 7,\ b = 11$
$a+b = 18$ Ans

46.

$\frac{(0.325+0.175)^2}{(0.325)^2-(0.175)^2}$ Ans → $\frac{11}{3}$
$= \frac{0.325+0.175}{0.325-0.175} = \frac{0.5}{0.15} = \frac{1}{3}$ ×

47.

$\frac{-(x-y)}{xy} = \frac{11}{24}$
$xy = -24$
$x^3-y^3+x^2y^2$
$= 11(11^2+3x-24)+576$
$= 1115$ Ans

48.

$16x^2+y^2+8xy = 48+8x2$
$4x+y = 8$
$64x^3+y^3 = 8(48-4x2)$
$= 320$ Ans

49.

Let $a = 4$
$a^2+\frac{16}{a^2} = 16+1 = 17$

50.

$4x^4-37x^2+9 = 0$
$4x^2+\frac{9}{x^2} = 37$
$2x-\frac{3}{x} = 5$

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51.

$$x^4+\frac{16}{x^4}=433$$

$$x^2+\frac{4}{x^2}=21$$

$$x+\frac{2}{x}=5 \quad \text{Ans}$$

52.

$$4x^4-5x^2+1=0$$
$$4x^4-4x^2-x^2+1=0$$
$$(4x^2-1)(x^2-1)=0$$
$$x^2=1 \Rightarrow x=1$$
$$2x^2-x-1=2-1-1=0 \quad \text{Ans}$$

53.

$$a=1,\ b=1,\ c=-2 \text{ (let)}$$
$$\frac{(b+c)^2}{bc}+\frac{(c+a)^2}{ca}+\frac{(a+b)^2}{ab}$$
$$\Rightarrow \quad -\frac{1}{2}-\frac{1}{2}+4=3.$$

54.

$$\frac{5\times3\times(a^6-b^6)(b^6-c^6)(c^6-a^6)}{2\times3\times(a^3-b^3)(b^3-c^3)(c^3-a^3)}$$
$$=\frac{5}{2}(a^3+b^3)(b^3+c^3)(c^3+a^3)$$

55.

$$xy+yz+zx=\frac{169-91}{2}=39$$
$$xy+yz+y^2=39$$
$$y=3$$
$$x+z=13$$
$$x^2+z^2=82,\ xz=9$$
$$x-z=\sqrt{82-18}=8 \quad \text{Ans}$$

56.

$$(x-2y)\left[125x^3+y^3+75x^2y+15xy^2\right]$$

only look at x^3y terms,

$$-250x^3y+75x^3y$$
$$=-175x^3y \quad \text{Ans}$$

57.

$$x=\sqrt{5},\ y=\frac{\sqrt{5}}{4},\ z=\frac{1}{\sqrt{5}}$$

$$x-4y+8z=\sqrt{5}-\sqrt{5}+\sqrt{5}=\sqrt{5} \quad \text{Ans}$$

58.

$$x^2+y^2+xy=79$$
$$x-y=4,\ x^2+y^2-2xy=16$$
$$xy=21,\ x^2+y^2=58$$
$$x^4+y^4=(58)^2-882$$
$$=2482 \quad \text{Ans}$$

59.

$$x=9$$
$$x^2+\frac{162}{x^2}=81+2$$
$$=83 \quad \text{Ans}$$

60.

$$a+b+c=\sqrt{a^2+b^2+c^2+2(ab+bc+ca)}$$
$$=\pm26$$

But $a+b+c<0$, so $=-26$ Ans

61.

CurrentMUDDE

$$3x-y=\sqrt{(3x+y)^2-12xy}$$
$$=\sqrt{144-108}=6 \quad \text{Ans}$$

62.

$$(2x+3y+4z)(4x^2+9y^2+16z^2-6xy-12yz-8xz)$$
$$=8x^3+27y^3+64z^3-72xyz$$
$$4x^2+9y^2+16z^2-6xy-12yz-8xz=\frac{105-72}{11}$$
$$=3 \quad \text{Ans}$$

63.

Put $a=8$

$$a^2+\frac{64}{a^2}=65$$

64.

$$3a+b=\sqrt{(3a-b)^2+12ab}$$
$$=7$$
$$9a^2-b^2=1\times7=7 \quad \text{Ans}$$

65.

$$x^2+y^2+xy=\frac{117}{3(4+\sqrt{3})}$$
$$=3(4-\sqrt{3})$$

Adding

$$x^2+y^2+xy+x^2+y^2-xy$$
$$\Rightarrow 2(x^2+y^2)$$
$$\Rightarrow 3(4-\sqrt{3})+3(4+\sqrt{3})$$
$$=24$$
$$x^2+y^2=\frac{24}{2}=12$$

66.

$$x^2+\frac{1}{x^2}=\sqrt{6887+2}$$
$$=83$$
$$x-\frac{1}{x}=\sqrt{83-2}=9.$$

67.

$$3x-2y=-3$$
$$27x^3-8y^3+54xy=-27$$
$$27x^3+54xy+30-8y^3=30-27$$
$$=3 \quad \text{Ans}$$

68.

$$(ax+by)^2+(ay-bx)^2=(a^2+b^2)(x^2+y^2)$$
$$ay-bx=\sqrt{17\times25-64}$$
$$ay-bx=19 \quad \text{Ans}$$

69.

$$3p+5m=\sqrt{(3p-5m)^2+60pm}$$
$$=\pm\sqrt{385}$$
$$9p^2-25m^2=\pm5\sqrt{385} \quad \text{Ans}$$

70.

$$4a^2+b^2-2ab=4$$
$$(2a+b)^2=16$$
$$4a^2+b^2+4ab=16 \Rightarrow ab=2$$
$$4a^2+b^2=8$$
$$16a^4+b^4=64-32=32 \quad \text{Ans}$$

71.

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$x^2+\frac{4}{x^2} = \sqrt{87+17+8} = \sqrt{165}$

$x+\frac{2}{x} = \sqrt{165+4} = 13$ Ans

72.

$x+\frac{2}{x} = 7$

$x^2+\frac{4}{x^2} = 45$

$2x^2+\frac{8}{x^2} = 90$ Ans

73.

$xy = \frac{-7}{4}\times\frac{3}{14} = \frac{-3}{8}$

$x^2+y^2 = (x-y)^2+2xy = \frac{37}{16}$

$x^3-y^3 = (x-y)(x^2+y^2+xy)$

$= \frac{7}{4}\left(\frac{37}{16}-\frac{6}{16}\right) = \frac{217}{64}$

74.

$x+3y = \sqrt{x^2+9y^2+6xy} = 8$

$x^3+27y^3 = (x+3y)(x^2+9y^2-3xy)$

$= 8(40-12)$

$= 224$ Ans

75.

$4x^2+\frac{1}{x^2} = 53$

$8x^3-\frac{1}{x^3} = 7(53+2) = 385$

$\frac{8x^6+5x^3-1}{8x^6-25x^3-1} = \frac{8x^3-\frac{1}{x^3}+5}{8x^3-25-\frac{1}{x^3}}$

$= \frac{390}{360} = \frac{13}{12}$ Ans

76.

$\sqrt{x}-\frac{1}{\sqrt{x}} = \sqrt{14}$

$x+\frac{1}{x} = 16$

$x^2+\frac{1}{x^2} = 16^2-2 = 254$

$\sqrt{x^2+\frac{1}{x^2}} = 15.9$ Ans

77.

$a^3+b^3 = (a+b)\left\{(a+b)^2-3ab\right\}$

$= \frac{3}{4}\left(\frac{9}{16}-\frac{6}{16}\right) = \frac{9}{64}$

$a^4+b^4+ab^3+a^3b = (a^3+b^3)(a+b)$

$= \frac{27}{256}$ Ans

78.

$x+\frac{9}{x} = 10$

$x^2+\frac{81}{x^2} = 10^2-2\times9$

$= 82$

$x^4-82x^2 = -81$

$x^2(x^2-82) = -81$ Ans

79.

$a^3+b^3+c^3-3abc = (a+b+c)\left\{a^2+b^2+c^2-ab-bc-ca\right\}$

$ab+bc+ca = \frac{6^2-32}{2} = 2$

$189-3abc = 6(72-2)$

$abc = 3$

$abc-3 = 0$ Ans

80.

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$x^2+\frac{1}{x^2} = 23$

$x+\frac{1}{x} = 5$

$x^3+\frac{1}{x^3} = 5(23-1) = 110$

81.

$(x+y)^3-(x-y)^3-3y(2x^2-3y^2) = ky^3$

$2y(2x^2+2y^2+x^2-y^2)-6x^2y+9y^3 = Ky$

$6x^2y+2y^3-6x^2y+9y^3 = Ky^3$

$11y^3 = Ky^3$

$K = 11$ Ans

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82.

$x+\frac{1}{x} = 7$

$x^2+\frac{1}{x^2} = 47$

$x^3+\frac{1}{x^3} = 322$

$\frac{x^4+\frac{1}{x^2}}{x^2+1} = \frac{x^3+\frac{1}{x^3}}{x+\frac{1}{x}} = 46$

83.

$16a^2+9b^2 = 1+12 = 13$

$4a+3b = \sqrt{13+12} = 5$

$64a^3+27b^3 = 5(13-6) = 35$

84.

$P(\triangle DEF) = \frac{25.6+18.8+20.4}{2}$

$= 32.4$ cm Ans

85.

$\left(a+\frac{1}{a}+3\right)^3 = 216$

$a+\frac{1}{a} = 3$

$a^2+\frac{1}{a^2} = 7$ Ans

86.

$\text{Cosec}\,A = \text{Sec}\,B$

$A+B = 90^\circ$

87.

$847\times385\times675\times3025 = 3^3\times5^5\times7^2\times11^4$

$a=3,\ b=5,\ c=2,\ d=4$ Ans → 5

$ab-cd = 7$ Ans ✗

88.

$a^2+b^2+c^2 = \frac{34+61+45}{2} = 70$

$a = \sqrt{70-61} = 3,\ b = \sqrt{70-45} = 5$

$c = \sqrt{70-34} = 6$

$b-a : c-b : c-a = 2:1:3$

89.

$\frac{22\sqrt{2}}{4\sqrt{2}-\sqrt{3+\sqrt{5}}} = \frac{22\sqrt{2}}{4\sqrt{2}-\frac{(\sqrt{5}+1)}{\sqrt{2}}} = \frac{44}{7-\sqrt{5}}$

$= 7+\sqrt{5}$

$a=7,\ b=1$

$ab : a+b = 7:8$ Ans

90.

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$x^3+y^3+z^3-3xyz = \frac{32.5+34.6+30.9}{2}$

$\left\{(32.5-34.6)^2+(34.6-30.9)^2+(30.9-32.5)^2\right\}$

$0.98K = 49 \times \left\{4.41+13.69+2.56\right\}$

$K = 1033$ Ans

91.

$\frac{\sqrt{52-2\times7\sqrt{3}}}{\sqrt{28+2\times5\times\sqrt{3}}} = \frac{7-\sqrt{3}}{5+\sqrt{3}} = \frac{19-6\sqrt{3}}{11}$

$a=-6,\ b=19$

$\sqrt{b-a} = \sqrt{25} = 5$ Ans

92.

$\frac{(\sqrt{7}+\sqrt{5})}{(\sqrt{7}-\sqrt{5})} \times \frac{\sqrt{2}(\sqrt{7}-\sqrt{5})}{\sqrt{2}(\sqrt{7}+\sqrt{5})} + \frac{\sqrt{2}\sqrt{5}}{\sqrt{5}}$

$= 1+\sqrt{2}$

93.

$x=0$

$\frac{(y+2)(y-2)-0}{y(y+2)2}$

$= 1$

94.

$a^4+b^4 = -a^2b^2$

$(a^4+b^4+a^2b^2)=0$

$(a^2-b^2)(a^4+b^4+a^2b^2)=0(a^2-b^2)$

$a^6-b^6=0$

95.

$p=\frac{1}{q}$

$\frac{p^2+q^2}{q} \Rightarrow p^3+\frac{1}{p^3}$

$p+\frac{1}{p} = \frac{(\sqrt{3}-\sqrt{2})^2+(\sqrt{3}+\sqrt{2})^2}{3-2}$

$= 10$

$p^3+\frac{1}{p^3} = 10^3-3\times10$

$= 970$

96.

$(-3xy^2+1)(7x^3-5x^2y-2y^3+3xy^2+2x-5)$

$-3xy^2\times7x^3,\ -3xy^2\times3xy^2$

$-21x^4y^2,\ -9x^2y^4$

Sum $= -21-9 = -30$

97.

$\frac{5x^2+10x-5}{2x} = 1$

$\frac{5x}{2}+5-\frac{5}{2x} = 1$

$\frac{5}{2}\left(x-\frac{1}{x}\right) = -4$

$x-\frac{1}{x} = -\frac{8}{5}$

98.

$x^3+y^3+z^3-3xyz$

$=(x+y+z)\frac{1}{2}\left[(x-y)^2+(y-z)^2+(z-x)^2\right]$

$= 1382\times\frac{1}{2}\times\left[(-1)^2+(-3)^2+4^2\right]$

$= 1382\times\frac{1}{2}\times26$

$= 17966$

99.

$(a-b)^2+(b-c)^2+(c-a)^2$

$= 2(a^2+b^2+c^2-ab-bc-ca)$

$= 2\left(117-\frac{(17^2-117)}{2}\right)$

$= 2(117-86)$

$= 62$

100.

$x=y=z=3$

$\left(\frac{1}{3-1}\right)\left(\frac{1}{3-\frac{1}{3}}\right)\times3$

$= \frac{1}{2}\times\frac{2}{3}\times3$ Same Pattern

$= 1$

101.

$\frac{x^3+y^3}{x^2-xy+y^2} = \frac{(x+y)(x^2-xy+y^2)}{x^2-xy+y^2} = \frac{3}{1}$

$= x+y = 3$

$\frac{x^2-y^2}{x+y} = \frac{(x-y)(x+y)}{(x+y)} = \frac{5}{6}$

$6x-6y = 5$

$x+y = 3$

$x = \frac{23}{12}$

$y = \frac{13}{12}$

$2x:3y = 46:39$

102.

$\alpha+\beta = \frac{-b}{a} = -\frac{(-6)}{1} = 6$

$\alpha_1+\beta_1 = \frac{-b}{a} = -\frac{(-15)}{1} = 15$

Sum $= 15+6 = 21$

103.

$\frac{1}{a}+\frac{1}{b}+\frac{1}{c} = 0$

$ab+bc+ca = 0$

$(a+b+c)^2 = a^2+b^2+c^2+2(ab+bc+ca)$

$= a^2+b^2+c^2+0$

$(a+b+c)^2 = a^2+b^2+c^2$

104.

$\left(a+\frac{1}{a}\right)^2 = 3$

$a^2+\frac{1}{a^2} = 1$

$a^4+1 = a^2$

$a^4-a^2+1=0$

$(a^2+1)(a^4-a^2+1) = 0\times(a^2+1)$

$(a^2)^3+(1)^3 = 0$

$a^6 = -1$

$a^{216}.a^2+a^{210}.a^2+a^{24}+a^{18}$

$= a^2-a^2+1-1$

$= 0$

II $a+\frac{1}{a} = \sqrt{3}$

$\boxed{a^6 = -1}$

105.

$a = \sqrt{7}+\sqrt{8}$

$b = \sqrt{7}-\sqrt{8}$

$ab = -1$

$a^2+b^2 = (a+b)^2-2ab$

$= (2\sqrt{7})^2-2\times(-1)$

$= 30$

$3\times30-10\times(-1)$

$= 100$

106.

$a^2+\frac{1}{a^2} = 18$

$\left(a+\frac{1}{a}\right)^2 = 18+2 = 16$

$\left(a-\frac{1}{a}\right)^2 = 4^2$

$a-\frac{1}{a} = 4, -4$

$\frac{a^2+2a-1}{a}$

$= a-\frac{1}{a}+2$

$6, -2$

107.

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$\frac{x}{2a} = 3x+y+2$

$\frac{y}{2a} = x+3y+2$

$+\frac{z}{2a} = x+y+3z$

$\frac{x+y+z}{2a} = 5(x+y+z)$

$a = \frac{1}{10}$

108.

$a-b = 2$

$a^3-b^3-3ab(a-b) = 8$

$8a-6ab = 8$

$6ab = 72$

$ab = 12$

109.

$\frac{1}{x^2+a^2} = x^2-a^2$

$x^4-a^4 = 1$

$x^4 = 1+a^4$

$x = (a^4+1)^{1/4}$

110.

$\frac{1}{1+a+\frac{1}{b}} + \frac{1}{1+b+\frac{b}{c}} + \frac{1}{1+\frac{c}{b}+\frac{1}{a}}$

$= \frac{1}{1+a+\frac{1}{b}} + \frac{1}{1+b+\frac{abc}{c}} + \frac{1}{1+\frac{c}{abc}+\frac{1}{a}}$

$\frac{b}{b+ab+1} + \frac{1}{1+b+ab} + \frac{ab}{1+b+ab}$

$\frac{b+1+ab}{b+ab+1} = 1$

111.

$26p = p^2-5p+1$

$p^2-26p+1 = 0$

$p^2+1 = 26p$

$p+\frac{1}{p} = 26$

112.

$x+y = \frac{(\sqrt{5}-\sqrt{4})^2+(\sqrt{5}+\sqrt{4})^2}{(\sqrt{5})^2-(\sqrt{4})^2}$

$= 18$

$xy = 1$

$\frac{x^2+y^2+2xy-3xy}{x^2+y^2+2xy-xy}$

$= \frac{(x+y)^2-3xy}{(x+y)^2-xy}$

$= \frac{324-3}{324-1}$

$= \frac{321}{323}$

113.

$y-1 = \sqrt{3}+2$

$y^2+1-2y = 7+4\sqrt{3}$

$y^2-2y = 6+4\sqrt{3}$

$\times y \left[y^4+4y^2-4y^3 = 36+48+48\sqrt{3} \right.$

$\left. 7y^2-14y = 42+28\sqrt{3} \right.$

$y^4-3y^2-4y^3+14y = 42+20\sqrt{3}$

$\times 2$

$2y^4-8y^3-6y^2+28y = 84+40\sqrt{3}$

$= 40\sqrt{3}$

114.

$x+\frac{1}{x} = 1$

$x^3 = -1$

$x^9(x^3+1)+x^3(x^3+1)+1$

$-1 \qquad -1$

$0+0+1 = 1$

115.

$\frac{a^2+b^2}{ab} = 1, \; a^2+b^2-ab = 0$

$a^3+b^3 = (a+b)(a^2+b^2-ab)$

$= (a+b) \times 0$

$= 0$

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116.

$p = 7+4\sqrt{3}$

$\frac{1}{p} = 7-4\sqrt{3}$

$p+\frac{1}{p} = 14$

$p^3+\frac{1}{p^3} = 2744-42$

$= 2702$

$\frac{p^3+\frac{1}{p^3}+p+\frac{1}{p}}{1} = 2702+14$

$= 2716$

117.

$x = y = z = 1$

$\frac{10+5+7}{13+6+3} = \frac{22}{22} = 1$

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118.

$a^2b^2+c^2-1024 = -2ab+2bc+2ca$

$a^2+b^2+c^2-2(ab-bc-ca) = 1024$

$(a+b-c)^2 = 32^2$

$-c+(a+b) = 32$

$-c+5c = 32$

$c = 8$

119.

$x^4+\frac{1}{x^4} = 2207$

$\left(x^2+\frac{1}{x^2}\right)^2 = (2207+2)$

$x^2+\frac{1}{x^2} = 47$

$x+\frac{1}{x} = 7$

$x^3+\frac{1}{x^3} = 7^3-3\times7$

$= 322$

$x^4+\frac{1}{x^4} = 2207$

$x^7+\frac{1}{x^7} = \left(x^3+\frac{1}{x^3}\right)\left(x^4+\frac{1}{x^4}\right)-\left(x+\frac{1}{x}\right)$

$= 322 \times 2207-7$

$= 710647$

120.

$x+\frac{y^2}{x} = 5$

$x^2+y^2 = 5x$

$y^2 = 5x-x^2$

$\frac{x^2+2x+y^2}{x^3-5x^2}$

$= \frac{5x+2x}{x(x^2-5x)}$

$= \frac{7x}{x(-y^2)}$

$= -\frac{7}{y^2}$

121.

$(a+1)^2+(a+2)^2 = 16$

$a^2+1+2a+a^2+4+4a = 16$

$2a^2+6a = 11$

$4a^2+12a = 22$

$\Rightarrow 22+40 = 62.$

122.

$2x-1 = 0$

$x = \frac{1}{2}$

$3\left(\frac{1}{2}\right)^4-2\left(\frac{1}{2}\right)^2+4\times\frac{1}{2}-1$

$3\times\frac{1}{16}-2\times\frac{1}{4}+2-1$

$\frac{3}{16}-\frac{1}{2}+1 = \frac{11}{16}$

123.

$k+\frac{1}{k} = -2$

$k = -1$

$(-1)^{10}+\frac{1}{(-1)^{11}}$

$1-1 = 0$

124.

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$3\left[a-\frac{1}{a}\right]+\left[a-\frac{1}{a}\right]^3$

Put $a=2$

$3\left[2-\frac{1}{2}\right]+\left[2-\frac{1}{2}\right]^3$

$3\times\frac{3}{2}+\frac{27}{8}=\frac{63}{8}$

$a^3-\frac{1}{a^3}=\frac{63}{8}$

125.

No of term $=(100-21)+1$
$=80$

$199+195+191+\ldots+43$
— 40 term

Sum $=\frac{40}{2}[43+199]$
$=20\times242=4840$

$\left(k^8-\frac{1}{k^8}\right)\left(k^2-\frac{1}{k^2}\right)\left(k^2+\frac{1}{k^2}\right)$

$\left(k^8-\frac{1}{k^8}\right)\left(k^4-\frac{1}{k^4}\right)$

$\neq k^{16}-\frac{1}{k^{16}}$

only 1

126.

$a+\frac{1}{a}=1$

$a^3=-1$

$\left(\frac{x}{13}\right)^3=-1$

$x^3=-2197$

127.

$x+\frac{1}{x}=2\cos\theta$

$x^3+\frac{1}{x^3}=8\cos^3\theta-6\cos\theta$
$=2(4\cos^3\theta-3\cos\theta)$
$=2\cos3\theta$

128.

$2a+3b=4$

$8a^3+27b^3+18ab\times4=64$

$16+72ab=64$

$ab=\frac{2}{3}$

$(2a+3b)^2=16$

$4a^2+9b^2+12ab=16$

$4a^2+9b^2=16-12\times\frac{2}{3}=8$

$(4a^2+9b^2)^2=64$

$16a^4+81b^4+2\times4a^2\times9b^2=64$

$16a^4+81b^4=64-72\times\frac{2}{3}\times\frac{2}{3}$

$=64-32$

$=32$

129.

$x=2-2^{1/3}+2^{2/3}$

$x-2=2^{2/3}-2^{1/3}$

$x^3-8-6x(x-2)=4-2-6(x-2)$

$x^3-8-6x^2+12x=2-6x+12$

$x^3-6x^2+18x=14+8$

$=22$

130.

$a+b+c=0$

$a^3+b^3+c^3=3abc$

$\frac{3(x-y)(y-z)(z-x)}{6(x-y)(y-z)(z-x)}$

$=\frac{1}{2}$

131.

$mx^n=nx^n$

$\frac{m}{n}=\frac{x^n}{x^m}$

$m=x^{n-m}$

$n=x^{m-n}$

$\frac{x^m+x^n}{x^m-x^n}+\frac{m+n}{m-n}$

$=\frac{1}{m+n}+\frac{1}{m-n}$

$=\frac{2n}{m^2-n^2}\times\frac{x^n}{x^n}$

$=\frac{2nx^n}{x^n(m^2-n^2)}$

$=\frac{2mn}{x^n(m^2-n^2)}$

132.

$a-5-\frac{1}{a-5}=10-5$

$(a-5)^3-\frac{1}{(a-5)^3}=5^3+3\times5$

$=140$

133.

$x^4+\frac{1}{x^4}=1154$

$x^2+\frac{1}{x^2}=\sqrt{1154+2}=34$

$x+\frac{1}{x}=6$

$x^3+\frac{1}{x^3}=216-18=198$

134.

$\frac{x^8+1}{x^4}=14$

$x^4+\frac{1}{x^4}=14$

$x^2+\frac{1}{x^2}=4$

$x^6+\frac{1}{x^6}=4^3-3\times4$
$=64-12$
$=52$

135.

$\frac{(x+y)^3-(x-y)^3-6y(x^2-y^2)}{[(x+y)-(x-y)]\left[(x+y)^2+(x-y)^2+(x+y)(x-y)\right]-6y(x^2-y^2)}$

$=2y\left(2x^2+2y^2+x^2-y^2\right)-6yx^2+6y^3$

$=6yx^2+2y^3-6yx^2+6y^3$

$=8y^3$

136.

$x^2+6x+1=0$

$x+\frac{1}{x}+6=0$

$x+6=-\frac{1}{x}$

$6+x=\frac{-1}{x+6}+6$

$(x+6)+\frac{1}{x+6}=6$

$(x+6)^3+\frac{1}{(x+6)^3}=216-18$
$=198$

137.

$S-\frac{1}{S-8}=20$

$(S-8)-\frac{1}{(S-8)}=20-8=12$

$(S-8)^3-\frac{1}{(S-8)^3}=12^3+3\times12$
$=1764$

138.

$21kx^2+24k+7x+14x^2-9$

$21kx^2+14x^2+7x+24k-9$

$x^2(21k+14)+7x+24k-9$

$\Rightarrow k(7x^2+8)+px+(2x^3-3)=0$

$=(7k+2)x^2+px+8k-3=0$

$\frac{21k+14}{7k+2}=\frac{p}{p}=\frac{24k-9}{8k-3}$

$\frac{p}{8}=\frac{1}{3}$

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139.

$a^2+b^2 = 82, \quad b^2+c^2 = 65$

$9 \quad 1 \qquad 1 \quad 8$

$2\times9 + 7\times1 - 3\times8$

$= 1$

140.

$x^3 + 3x^2 + 3x$

$x^3 + 1^3 + 3x^2 + 3x + 1^3$

$(x+1)^3 - 1^3$

$(56)^3 - 1$

$= 175615$

141.

$x(x-5) = -1$

$x - 5 = -\frac{1}{x}$

$x + \frac{1}{x} = 5$

$x^3 + \frac{1}{x^3} = 5^3 - 3\times5 = 110$

$x^3 + \frac{1}{x^3} + 110 = 0$

$x^3 - 110 = -\frac{1}{x^3}$

$x^3\left(-\frac{1}{x^3}\right)$

$= -1$

142.

$\sin25\cdot\cos25 - \cos25\cdot\sin25$

$= 0$

143.

By option

$x = 3, y = 2$

$2^3 + 3^2 = 17$

$2^5 - 3^3 = 5$

144.

$\frac{(1+x^2)}{(1-x)}\times\frac{x-1}{(1-x^2)(1+x^2)} \times \frac{x(1-x^2)}{1+x}$

$\frac{x-1}{(1-x^2)(1+x)} = \frac{(x-1)x}{(1-x)(1+x)(1+x)}$

$= \frac{-(1-x)x}{(1-x)(1+x)^2} = \frac{-x}{(1+x)^2}$

145.

$x - y = 8, \quad 8xy = 8$

$8xy = 8$

$2[x^2-y^2] = [(x-y)(x-y)^2 + 8xy]\times2$

$= (8[64+8])\times2$

$= 1072$

146.

$\frac{1}{1\times2} + \frac{1}{2\times3} + \frac{1}{3\times4} \cdots \frac{1}{10\times11}$

$\frac{1}{1} - \frac{1}{2} + \frac{1}{2} - \frac{1}{3} \cdots \frac{1}{10} - \frac{1}{11}$

$1 - \frac{1}{11} = \frac{10}{11} < \frac{5}{6}$ ✗

$\frac{1}{1}\times\frac{1}{3} + \frac{1}{3}\times\frac{1}{5} + \frac{1}{5}\times\frac{1}{7} \cdots \frac{1}{11}\times\frac{1}{13}$

$= \frac{1}{2}\left[1 - \frac{1}{3} + \frac{1}{3} - \frac{1}{5} \cdots \frac{1}{11} - \frac{1}{13}\right]$

$\frac{1}{2}\left[1 - \frac{1}{13}\right] = \frac{6}{13} > \frac{7}{13}$ ✗

(D)

147.

$a^3 + 3a^2 + 3a = 63$

Add +1 on both sides

$a^3 + 1 + 3a^2 + 3a = 64$

$(a+1)^3 = 64$

$a + 1 = 4$

$a = 3$

$a^2 + 2a = 9 + 6 = 15$

148.

$(8\times6 - 5\times8)x = 26$

$8x = 26$

$x = \frac{13}{4}$

$100x = \frac{13}{4}\times100$

$= 325.$

149.

$\left(k - \frac{1}{k}\right)\left(k^2 + \frac{1}{k^2}\right)\left(k^4 + \frac{1}{k^4}\right)\times$

$\left(k^8 + \frac{1}{k^8}\right)\left(k^{16} + \frac{1}{k^{16}}\right)$

mul and Div by $\left(k + \frac{1}{k}\right)$

$\left(k + \frac{1}{k}\right)\left(k + \frac{1}{k}\right)\left(k^2 + \frac{1}{k^2}\right) \cdots \left(k + \frac{1}{k}\right)$

$\Rightarrow \left(k^4 - \frac{1}{k^4}\right)\left(k^4 + \frac{1}{k^4}\right) \cdots \left(k + \frac{1}{k}\right)$

$= \frac{\left(k^{32} - \frac{1}{k^{32}}\right)}{\left(k + \frac{1}{k}\right)}$

150.

$k + \frac{1}{k} = -3$

$\frac{k^6}{k^3} + \frac{1}{k^3} + \frac{k^4}{k^2} + \frac{1}{k^2}$

$k^3 + \frac{1}{k^3} + k^2 + \frac{1}{k^2}$

$(-3)^3 - 3(-3) + (-3)^2 - 2$

$-27 + 9 + 9 - 2$

$= -11.$

151.

$\frac{1}{2}\frac{(a+b+c)(a-b)^2 + (b-c)^2 + (c-a)^2}{(a+b+c)}$

$\frac{1}{2}\times(36 + 25 + 9)$

35

152.

$A^3 = 1$

$\frac{1+1-1}{1+1-1} = 1.$

153.

$(x+1)^2 + (x+2)^2 = 16$

$x^2 + 1 + 2x + x^2 + 4 + 4x = 16$

$2x^2 + 6x = 11$

$4x^2 + 12x = 22$

$+40 \quad +40$

62

154.

$a - b = 8, \quad ab = 21$

$3(a^3 - b^3)$

$a^3 - b^3 = (a-b)((a-b)^2 + 3ab)$

$8[64 + 63]$

$a^3 - b^3 = 8\times127$

$3(a^3 - b^3) = 3\times1016$

$= 3048.$

155.

$6^x = 3^y \times 2^z$

$x = yz$

$6 = k^{xz}$

$3\times2 = k^{\frac{1}{y} + \frac{1}{z}}$

$k^{\frac{1}{x}} = k^{\frac{1}{y} + \frac{1}{z}}$

$\frac{1}{x} = \frac{1}{y} + \frac{1}{z}$

$\frac{1}{y} + \frac{1}{z} - \frac{1}{x}$

$\frac{1}{x} - \frac{1}{y} = 0$

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$4^2-3^2+6^2-5^2+8^2-7^2 \ldots 95^2-91^2$

$(4+3)(4-3) \ldots (92+91)(92-91)$

$7+11+15 \ldots 189$

Terms $= \frac{188-7}{4}+1 = 45$

Sum $= \frac{45}{2}(189+7)$

$= 4275$

157.

$x+y+z=0$

$x^3+y^3+z^3 = 3xyz$

$\frac{x}{(yz)^2}+\frac{y}{(xz)^2}+\frac{z}{(xy)^2}$

$\frac{x^3+y^3+z^3}{(xyz)^2} = \frac{3xyz}{(xyz)^2}$

$= \frac{3}{xyz}$

158.

$\frac{k}{k^2-2k+1} = \frac{1}{6}$

$6k = k^2-2k+1$

$k^2-8k+1=0$

$k+\frac{1}{k} = 8$

$k^3+\frac{1}{k^3} = 8^3-3\times 8$

$= 488$

159.

$m-\frac{1}{m} = 7$

$m^2+\frac{1}{m^2} = 7^2+2 = 51$

160.

$\left(\frac{4}{x}+y\right)\left(\frac{16}{x^2}+y^2-\frac{4y}{3}\right)$

$\left(\frac{4}{-2}+1\right)\left(\frac{16}{4}+1-\frac{4\times 1}{-2}\right)$

$(-2+1)(4+1+2) = (-1)(7)$

$= -7.$

161.

$x^2 = 35+5\sqrt{13}+35-5\sqrt{13} - 2\sqrt{35^2-25\times 13}$

$x^2 = 70$

$x = \sqrt{70}$

$y = \frac{3-\sqrt{10}}{3+\sqrt{10}} \times \frac{(3-\sqrt{10})}{(3-\sqrt{10})}$

$= \frac{(9+10-6\sqrt{10})}{-1}$

$y = 6\sqrt{10}-19$

$x-y = 19-5\sqrt{10}$

$A=19, \quad B=-5$

$A-B = 19+5$

$= 24$

162.

$\frac{2x}{x+2}+\frac{1}{2(x+2)}-\frac{12-x}{2x(x+2)} = a+\frac{b}{x}$

$= \frac{4x^2+2x-12+x}{2x(x+2)}$

$= \frac{2x^2+x-6}{x(x+2)}$

$= \frac{2x^2+4x-3x-6}{x(x+2)}$

$= \frac{2x(x+2)-3(x+2)}{x(x+2)}$

$= \frac{(2x-3)(x+2)}{x(x+2)}$

$= 2-\frac{3}{x}$

$a = 2$

$b = -3$

$ab = -6$

163.

$x^2+\frac{1}{x^2} = 2\sqrt{5}$

$x^4+\frac{1}{x^4} = 18$

$x^4-\frac{1}{x^4} = \sqrt{18^2-4}$

$= \sqrt{320}$

$= 8\sqrt{5}$

164.

$(2a+b)^2 = (10)^2, \quad 2ab = 9$

$4a^2+b^2+4ab = 100$

$4a^2+b^2+18 = 100$

$4a^2+b^2 = 82$

Now, $(2a-b)^2 = (k)^2$

$4a^2+b^2-4ab = k^2$

$82-18 = k^2$

$k = 8$

$2a-b = 8$

165.

$64x^3+38x^2y+20xy^2+y^3$

$= (4x)^3+y^3+48x^2y+12xy^2-10x^2y+8xy^2$

$= (4x+y)^3-10x^2y+8xy^2$

$8^3-10\times 9(-4)+8\times 3(-4)^2$

$= 512+360+96\times 4$

$= 1256$

166.

$x^4+\frac{1}{x^4} = 254$

$x^2+\frac{1}{x^2} = \sqrt{254+2} = 16$

$x+\frac{1}{x} = \sqrt{16+2} = 3\sqrt{2}$

$x^3+\frac{1}{x^3} = 5\sqrt{2}-9\sqrt{2}$

$= 45\sqrt{2}$

$x^5+\frac{1}{x^5} = 45\sqrt{2}\times 16-3\sqrt{2}$

$= 717\sqrt{2}$

167.

$y+2x-[(y-(y-x+y)-(x+y)+y] - 2y$

$y+2x-[(y-(2y-x)-x-y+y]-2y$

$y+2x+y-2y$

$= 2x$

168.

$3+9+27+81+243+729+2187+6561 = 9840$

169.

$x-\frac{1}{x} = \sqrt{6}$

$x+\frac{1}{x} = \sqrt{6+4} = \sqrt{10}$

$x^2+\frac{1}{x^2} = 8$

$x^2-\frac{1}{x^2} = \sqrt{60}$

$x^4-\frac{1}{x^4} = 16\sqrt{15}$

$x^4+\frac{1}{x^4} = 62$

$x^8-\frac{1}{x^8} = 62\times 16\sqrt{15}$

$= 992\sqrt{15}$

170.

$a+\frac{1}{a} = 7$

$a^2+\frac{1}{a^2} = 47$

$a^3+\frac{1}{a^3} = 343-21 = 322$

$a^5+\frac{1}{a^5} = 322\times 47-7$

$= 15127$

171.

$a=b=c=1$

$\frac{11+13+17}{17+9+15} = \frac{41}{41} = 1$

172.

$x+\frac{1}{x} = 5$

$x^2+\frac{1}{x^2} = 23$

$x^4+\frac{1}{x^4} = 527$

$x-\frac{1}{x} = \sqrt{25-4}$

$= \sqrt{21}$

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$x^8-\frac{1}{x^8}=\left(x^4+\frac{1}{x^4}\right)\left(x^2+\frac{1}{x^2}\right)\left(x+\frac{1}{x}\right)\left(x+\frac{1}{x}\right.$
$= 527\times23\times5\times21$
$= 606605\sqrt{21}$

173.

$A \propto B+18$
$A = k(B+18)$
$108 = k(36+18)$
$k = 2$
$A = 2(68+18)$
$= 172$

174.

$x-\frac{1}{x}=2\sqrt{2}$
$x^2+\frac{1}{x^2}=10$
$x^2-\frac{1}{x^2}=\sqrt{100-4}=4\sqrt{6}$
$x^6-\frac{1}{x^6}=(4\sqrt{6})^3+3\times4\sqrt{6}$
$= 64\times6\sqrt{6}+12\sqrt{6}$
$= 396\sqrt{6}$

175.

$P=\frac{x}{y+z}\Rightarrow P+1=\frac{x+y+z}{y+z}$
$1+Q=\frac{x+y+z}{x+z}$
$1+R=\frac{x+y+z}{x+y}$
$=\frac{1}{2}\left[\frac{1}{1+P}+\frac{1}{1+Q}+\frac{1}{1+R}\right]$
$=\frac{1}{2}\left[\frac{y+z+x+z+x+y}{x+y+z}\right]$
$\frac{1}{2}\times2=1$

176.

$x^2-15x+1=0$
$x+\frac{1}{x}=15$
$x^2+\frac{1}{x^2}=223$
$x^4+1=223x^2$
$x^4-223x^2+6=5$

177.

$\frac{3y}{1+\frac{1}{y}}=2$
$\frac{1+\frac{1}{y}}{}$
$3y=2\left(1+\frac{1}{\frac{1-y+y}{1-y}}\right)$
$3y=2(1+1-y)$
$3y=4-2y$
$5y=4$
$y=\frac{4}{5}$

178.

$\frac{1}{P}+\frac{1}{Q}+\frac{1}{R}=1$
$PQ+QR+PR=PQR$
$PQ+QR+PR=P+Q+R=1$
$P^3+Q^3+R^3-3PQR$
$=(P+Q+R)(P+Q+R)^2-3(PQ+QR+P$
$=1[1-3]+3$
$=-2+3$
$=1$

179.

$x^2-\frac{1}{x^2}=4\sqrt{2}$
$x+\frac{1}{x}=2\sqrt{2}$, $x-\frac{1}{x}=2$
$x^2+\frac{1}{x^2}=8-2=6$
$x^4-\frac{1}{x^4}=\left(x^2+\frac{1}{x^2}\right)\left(x^2-\frac{1}{x^2}\right)$
$=6\times2\sqrt{2}\times2$
$=24\sqrt{2}$

180.

$x+\frac{1}{x}=2$
$x=1.$
$x^{11}+\frac{1}{x^{20}}=1+1$
$=2$

181.

$ax+by=1$
$bx+ay=\frac{2ab}{a^2+b^2}$

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$x+y=\frac{a+b}{a^2+b^2}$
$x-y=\frac{a-b}{a^2+b^2}$
$2x=\frac{2a}{a^2+b^2}$
$x=\frac{a}{a^2+b^2}$

182.

$4x^2+y^2=40$
$xy=6$
$(2x-y)^2=4x^2+y^2-4xy$
$=40-24$
$=16$
$2x-y=4$

183.

$\frac{x^2-3\cdot2x+1}{x}=\frac{0}{x}$
$x+\frac{1}{x}=3\cdot2$
$x-\frac{1}{x}=\sqrt{(3\cdot2)^2-4}=\sqrt{6\cdot24}$
$=4\sqrt{0\cdot39}$
$x^2-\frac{1}{x^2}=3\cdot2\times4\sqrt{0\cdot39}=12\cdot8\sqrt{0\cdot39}$

184.

$(a+b)^2+(b+c)^2+(c+a)^2=2(a^2+b^2+c^2)$
$+2ab+2bc+2ca.$

$(a+b+c)^2=a^2+b^2+c^2+2ab+2bc+2ca$
$17^2=115+2ab+2bc+2ca$
$2ab+2bc+2ca=174$
$2(115)+174=404.$

185.

$P-\frac{1}{P}=4$
$P^2+\frac{1}{P^2}=18$
$P^2+\frac{1}{P^2}+3\left(P-\frac{1}{P}\right)$
$18+3\times2=36$

186.

$a^2+b^2+c^2=ab+bc+ca$
जब $a=b=c$

$\frac{11a^4+13a^4+15a^4}{16a^4+19a^4+17a^4}=\frac{39a^4}{52a^4}=\frac{3}{4}$

187.

$x^2=2x-x+2$
$x(x-2)-1(x-2)$
$(x-1)(x-2)$

$\frac{(x-1)(x-2)}{(x+2)(x-2)}$

$\frac{x-1}{x+2}$

188.

$x^2+2=x$

$\frac{x^2+7x+2}{x^2+13x+2}=\frac{(x^2+2)+7x}{(x^2+2)+13x}$
$=\frac{x+7x}{x+13x}$
$=\frac{8}{14}=\frac{4}{7}$

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189.

$a^3+b^3+c^3-3abc$

$= \frac{a+b+c}{2}\left[(a-b)^2+(b-c)^2+(c-a)^2\right]$

$= \frac{730}{2}\times\left[126^2+35^2+155^2\right]$

$= 365\left[14400+1225+24025\right]$

$= 365\times 39650$

$= 14472250.$

190.

$\frac{(a+b)^2+(a-b)^2}{a^2+b^2}$

$= \frac{2(a^2+b^2)}{(a^2+b^2)}$

$= 2.$

191.

$(a+b)(a-b)-4\sqrt{ab}$

$(2\cot A)(2\cos A)-4\sqrt{\cot^2 A\cdot\cos^2 A}$

$4\cot A\cdot\cos A-4\sqrt{\frac{\cos^2 A(1-\sin^2 A)}{\sin^2 A}}$

$4\cot A\cdot\cos A-4\cos A\cdot\cot A$

$= 0$

192.

$\frac{a^2+b^2+c^2+2ab+2bc+2ca}{a+b+c}$

$= \frac{(a+b+c)^2}{a+b+c} = a+b+c$

$= 0.09+0.04+0.16$

$= 0.29$

193.

$a^2+b^2+c^2+2ab+2bc+2ca$

$=(a+b+c)^2$

$=(0.1+0.68+0.22)^2$

$=1^2=1.$

194.

$\sqrt{\frac{a}{b}}=\frac{8}{3}+\sqrt{\frac{b}{a}}$

$\sqrt{\frac{a}{b}}-\sqrt{\frac{b}{a}}=\frac{8}{3}$

$\frac{a}{b}+\frac{b}{a}-2=\frac{64}{9}$

$\frac{a^2+b^2}{ab}=\frac{82x}{9x}$

$(a+b)^2=a^2+b^2+2ab$

$900=82x+18x$

$x=9$

$ab=9x$

$=81$

195.

$(2x+3y)^3=8x^3+27y^3+3\times 2x\times 3x y(2x+3y)$

$729=8x^3+27y^3+162\times 3$

$729-486=8x^3+27y^3$

$243=$

196.

$a^3+b^3+c^3=3abc$

Given $a+b+c=0$

$u+v+w=0\ ;\ u^2+v^2+w^2=6$

$\frac{3(u-v)(v-w)(w-u)}{3(u^2-v^2)(v^2-w^2)(w^2-u^2)}$

$=\frac{1}{(u+v)(v+w)(w+u)}$

197.

$x+\frac{1}{x}=5\sqrt{2}$

$x-\frac{1}{x}=\sqrt{50-4}=\sqrt{46}$

$x^3+\frac{1}{x^3}=25\sqrt{2}-15\sqrt{2}=235\sqrt{2}$

$x^3-\frac{1}{x^3}=46\sqrt{46}+3\sqrt{46}=49\sqrt{46}$

$x^6-\frac{1}{x^6}=235\sqrt{2}\times 49\sqrt{46}$

$=23030\sqrt{23}$

198.

$a=\frac{1}{a-\sqrt{6}}$

$a^2-\sqrt{6}a=1$

$a-\frac{1}{a}=\sqrt{6}$

$a+\frac{1}{a}=\sqrt{6+4}=\sqrt{10}$

199.

$p+q+r=6$

$r=0$

$p=1$

$q=-1$

$\frac{p^2}{p^2-qr}+\frac{q^2}{q^2-pr}+\frac{r^2}{r^2-pq}$

$\frac{p^2}{p^2}+\frac{q^2}{q^2}+\frac{r^2}{r^2-pq}$

$1+1+0=2$

200.

$b^2=4ac$

$(2k)^2=4\times 3\times 3$

$k=3$

201.

$a^3+b^3+c^3=3abc$

Given $a+b+c=0$

$\frac{3(l-m)(m-n)(n-l)}{12(l-m)(m-n)(n-l)}$

$=\frac{1}{4}$

202.

$y^3-\frac{1}{y^3}=\left(y^2+\frac{1}{y^2}\right)\left(y^2-\frac{1}{y^2}\right)-\left(y-\frac{1}{y}\right)$

$=(81+2)(729-27)-(-9)$

$=-83\times 756+9$

$=-62739$

203.

$(a+b+c)^2-(a-b+c)^2+4ac$

$=a^2+b^2+c^2+2ab+2bc+2ac$

$-(a^2+b^2+c^2-2ab-2bc+2ac)+4ac$

$=4ab+4bc+4ac$

$=4(ab+bc+ac)$

204.

$x^2-11x+1=0$

$x+\frac{1}{x}=11$

$x^2+\frac{1}{x^2}=119$

$x^4+\frac{1}{x^4}=14159$

$x^8-14159x^2+11$

$=x^8-\left(x^4+\frac{1}{x^4}\right)x^4+11$

$=x^8-x^8-1+11$

$=10.$

205.

$x^2-5\sqrt{5}x+1=0$

$x+\frac{1}{x}=5\sqrt{5}$

$x-\frac{1}{x}=\sqrt{(5\sqrt{5})^2-4}=11$

$x^3-\frac{1}{x^3}=11^3+3\times 11=1364.$

206.

$\left(\frac{l^2}{mn}+\frac{m^2}{nl}+\frac{n^2}{lm}\right)^2$

$\left(\frac{l^3+m^3+n^3}{lmn}\right)^2$

$=\left(\frac{3lmn}{lmn}\right)^2\ \because\ [l+m+n=0]$

$=9.$

207.

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$x^2 - \sqrt{9.76}x + 1 = 0$

$x + \frac{1}{x} = \sqrt{9.76}$

$x^2 + \frac{1}{x^2} = 7.76$

$x - \frac{1}{x} = \sqrt{5.76} = 2.4$

$x^3 - \frac{1}{x^3} = \left(x - \frac{1}{x}\right)\left(x^2 + \frac{1}{x^2} + 1\right)$

$= 2.4 \times 8.76$

$= 21.024.$

208.

$x = y = z$

$$\frac{17x^4 + 9x^4 + 16x^4}{8x^4 + 6x^4 + 10x^4}$$

$\frac{42}{24} = 1.75$

209.

$3(1 + 3 + 3^2 + 3^3) + 3^4(3 + 3^2 + 3^3 + 3^4)$

$120 + 81 \times 120$

$120 \times 82 = 9840$

210.

$(x-1) - \frac{1}{x-1} = 3 - 1 = 2$

$(x-1)^2 + \frac{1}{(x-1)^2} = 2^2 + 2$

$= 4 + 2$

$= 6$

211.

$x^3 - y^3 = 184$

$184 = 4(x^2 + y^2 + xy)$

$x^2 + y^2 + xy = 46 \quad —(1)$

$x^2 + y^2 - 2xy = 16$

$xy = 10 \quad —(11)$

$(x+y)^2 = 56 \quad (1) + (11)$

$x + y = 2\sqrt{14}$

212. Ans → d

Arithmetic mean is the sum of deviations from the mid value. ✗

213.

$$1 + \frac{1}{1 + \frac{1}{5 + \frac{1}{\frac{7}{3}}}}$$

$$1 + \frac{1}{1 + \frac{7}{35+3}} = \frac{45+38}{45} = 1\frac{38}{45}$$

214.

$x^3(x^2 - 12x + 12) - 12x^2 + 12x - 1$

$1331(121 - 132 + 12) - [12(121 - 11) + 1]$

$= 10$

215.

$(8+9)(8^2 - 8 \times 9 + 9^2)$

$= 8^3 + 9^3 = 1241$

216.

$$\frac{2^3}{8^{6.42}} = \frac{8^{-4.06}}{x}$$

$x = \frac{8}{8} = 1$

217.

$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\frac{3}{a-b} = \frac{1}{a+b} = \frac{3}{3a+b-3}$

$2a + 4b = 0 \quad ; \quad 3a + b - 3 = a - b$

$a = -2b \quad ; \quad a = 3$

$b = -\frac{3}{2}.$

218.

$\frac{3}{7} = .428, \quad \frac{7}{53} = .13$

$\frac{41}{80} = .51 \quad \frac{29}{79} = .32$

219.

$a^3 + \frac{1}{a^3} = 343\sqrt{3} - 21\sqrt{3}$

$= 1008\sqrt{3}$

$a^6 + \frac{1}{a^6} = (1008\sqrt{3})^2 - 2$

$= 3048190$

↓

Unit digit Check.

220.

$$\frac{77^{77} + 77}{78}$$

$= (-1)^{77} + 77$

$= 76.$

221.

$x^2 + y^2 = 280 \quad xy = 120$

$$\sqrt{\frac{(x-y)^2}{(x+y)^2}} = \sqrt{\frac{280 - 240}{280 + 240}}$$

$= \sqrt{\frac{40}{520}} = \frac{1}{\sqrt{13}}$

222.

$x \propto \frac{y^3}{z^3}$

$x = \frac{k y^3}{z^3}$

$\frac{1}{36} = k \times \frac{8}{9}$

$k = \frac{9}{36 \times 8}$

$x = \frac{9}{36 \times 8} \times \frac{27}{25}$

$\Rightarrow 800x = 405$

223.

$AM \geq H.M$

$\frac{x+y+z}{3} \geq \frac{3}{\frac{1}{x} + \frac{1}{y} + \frac{1}{z}}$

$= 9.$

224.

$$\frac{x^3 + 15x^2 + 75x + 125}{x^2 - 25} \Rightarrow \frac{(x+5)(x-5)}{(x+5)(x-5)}$$

$= \frac{(x+5)^3}{x+5} = x^2 + 10x + 25$

225.

$(2a-b)^2 = 4a^2 + b^2 - 4ab$

$9 = 4a^2 + b^2 - 4ab$

$(2a-b)^3 = 8a^3 - b^3 - 6ab(2a-b)$

$27 = 8a^3 - b^3 - 6ab(3)$

$ab = 54$

$9 = 4a^2 + b^2 - 216$

$4a^2 + b^2 = 225$

$(2a+b)^2 = 225 + 4 \times 54$

$2a + b = 21$

$4a^2 - b^2 = (2a+b)(2a-b)$

$= 21 \times 3$

$= 63$

226.

₹ 20 ₹ 10

$x \quad y$

$30x + 0 = 480$ } +90

$20x + 10y = 390$

$10x + 20y = 300$ } +90

$30x = 480$

$x = 16$

227.

$x = 7 - 4\sqrt{3}$

$\frac{1}{x} = 7 + 4\sqrt{3}$

$x + \frac{1}{x} = 14$

$x^2 + \frac{1}{x^2} = 14^2 - 2 = 194$

228.

$a^2 + b^2 + c^2 - 2a - 2c + 2 = 0$

$(a^2 + 1 - 2a) + (c^2 + 1 - 2c) + b^2 = 0$

$(a-1)^2 + (c-1)^2 + b^2 = 0$

$a = 1 \quad 1^3 + 0^3 + 1^3$

$c = 1$

$b = 0 \quad = 2$

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NUMBER SYSTEM

CGL PRE 2020

Q.1 Find the greatest value of b so that 30a68b (a>b) is divisible by 11?
(a) 4 (b) 9 (c) 3 (d) 6

Q.2 What is the sum of the digits of the largest five-digit number, which is divisible by 5, 35, 39 & 65?
(A) 33 (b) 30 (c) 35 (d) 27

Q.3 The number 823p2q is exactly divisible by 7, 11 & 13. What is the value of (p-q)?
(A) 8 (b) 3 (c) 5 (d) 11

CHSL 2020

Q.4 If a number 54k31m82 is divisible by 11, what will be the maximum value of (k+m)?
(a) 23 (b) 13 (c) 12 (d) 11

Q.5 If the five-digit number 672xy divided by 3, 7 & 11, then what is the value of (6x + 5y)?
(a) 17 (b) 15 (c) 21 (d) 18

Q.6 If the number 87m6203m is divisible by 6, then find the sum of all possible values of m?
(a) 10 (b) 20 (c) 16 (d) 15

Q.7 When a number is divided by 3, the remainder is 2. Again, when the quotient is divided by 7, the remainder is 5, What will be the remainder when the original number is divided by 21?
(a) 14 (b) 13 (c) 17 (d) 16

Q.8 The largest 6 digit number exactly divisible by 243 is?
(a) 999943 (b) 999945 (c) 999947 (d) 999949

Q.9 If the difference between two numbers is 5 and the difference between their cubes is 1850, then the difference between their squares is?
(a) $5\sqrt{482}$ (b) $5\sqrt{483}$ (c) $5\sqrt{484}$ (d) $5\sqrt{485}$

Q.10 If the number A9257B684 is divisible by 11, then what is the least value of A-B?
(a) 14 (b) 3 (c) 0 (d) -8

Q.11 The sum of two numbers is 59 & their product is 1150. Find the sum of their squares?
(a) 1176 (b) 1181 (c) 1183 (d) 1178

Q.12 If a nine-digit number 1263487xy is divisible by both 8 & 5, then the greatest possible values of x & y, respectively are?
(a) 6 & 0 (b) 6 & 5 (c) 2 & 0 (d) 2 & 5

Q.13 n=475AB is a positive integer whose tens & units digits are A & B respectively. If n is divisible by 5, 8 & 9, then what is (10A+B)?
(a) 20 (b) 60 (c) 35 (d) 15

Q.14 The six-digit number 537xy5 is divisible by 125. How many such six digits are there?
(a) 4 (b) 2 (c) 3 (d) 5

MTS 2019

Q.15 When 6892, 7105 and 7531 are divided by the greatest number x, then the remainder in each case is y. What is the value of (x-y)?
(a) 123 (b) 137 (c) 147 (d) 113

Q.16 If $\frac{a}{b}=\frac{3}{4}, \frac{b}{c}=\frac{4}{5}, \frac{c}{d}=\frac{5}{6}$ then sum of the numerator and the denominator (which are co-primes) of $(\frac{a}{d})^{10}$ is?
(a) 1025 (b) 4097 (c) 2049 (d) 513

CPO 2018

Q.17 The square root of which of the following is a rational number?
(a) 1250.49 (b) 6250.49 (c) 1354.24 (d) 5768.28

Q.18 What is the sum of digits of the least number, which when divided by 15, 18 and 42 leaves the same remainder 8 in each case and is also divisible by 13?
(a) 25 (b) 24 (c) 22 (d) 26

CPO PRE 2019

Q.19 How many natural number less than 1000 are divisible by 5 or 7 but not by 35?
(a) 313 (b) 341 (c) 285 (d) 243

Q.20 The value of $\frac{\sqrt{0.6912}+\sqrt{0.5292}}{\sqrt{0.6912}-\sqrt{0.5292}}$ is:
(a) 1.5 (b) 0.9 (c) 15 (d) 9

CGL PRE 2019

Q.21 When 200 is divided by a positive integer X, the remainder is 8. How many values of X are there?
(a) 7 (b) 5 (c) 8 (d) 6.

CGL TIER II 2018

Q.22 The sum of the digit of a two digit no. is 1/7 of the number. The unit digit is 4 less than the tens digit. If the number obtained on reversing its digit is divided by 7, the remainder will be?
(a) 4 (b) 5 (c) 1 (d) 6

Q.23 Let X be the least number which when divided by 15,18,20 & 27 the remainder in each case is 10 & X is a

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multiple of 31. What least number should be added to X to make it a perfect square?
(a) 39 (b) 37 (c) 43 (d) 36

Q.24 If X is the remainder when 3^{61284} is divided by 5 & Y is the remainder when 4^{96} is divided by 6, then what is the value of (2X-Y)?
(a) -4 (b) 4 (c) -2 (d) 2

Q.25 In finding the HCF of two numbers by DIVISION method, the last divisor is 17 & the quotients are 1, 11 & 2, respectively. What is the sum of the two numbers?
(a) 833 (b) 867 (c) 816 (d) 901

Q.26 What is the remainder when $(127^{97} + 97^{97})$is divided by 32?
(a) 4 (b) 2 (c) 7 (d) 0

Q.27 Two positive numbers differ by 2001. When the larger number is divide by the smaller number, the quotient is 9 and the remainder is 41. The sum of the digits of the large numbers is?
(a) 15 (b) 11 (c) 10 (d) 14

CPO 2018

Q.28 The least number that should be added to 10000 so that it is exactly divisible by 327 is?
(a) 327 (b) 237 (c) 137 (d)190

Q.29 When a number is Successively divided by 3, 4 & 7, the remainder obtained is 2, 3 & 5 respectively. What will be the remainder when 42 divides the same number?
(a) 31 (b) 41 (c) 30 (d) 29

CHSL 2020

Q.30 $2X - 3Y$ is a factor of ?
(a) $4X^2 + 9Y^2 + 12XY$ (b) $8X^3 + 27Y^3$
(c) $4X^2 + 9Y^2 - 12XY$ (d) $4X^2 + 36Y^2 + 12XY$

Q.31 If 4M37094267N is divisible by both 8 & 11, where M & N are single digit integers, then the values of M & N are:
(a) M = 5, N = 6 (b) M = 2, N = 5
(c) M = 5, N = 2 (d) M = 5, N = 4

Q.32 $2^{18} - 1$ is divisible by?
(a) 11 (b) 17 (c) 13 (d) 7

Q.33 If $X^3 + 2X^2 - aX - b$ is exactly divisible by $(X^2 - 1)$, then the values of a & b are?
(a) a = -1 , b = 2 (b) a = 1 , b = -2
(c) a = 1 , b = 2 (d) a = 2 , b = 2

Q.34 The value of 1 + 3+ 5+ 7 .....(2n – 1) is: ?
(a) (2n – 1) × (2n – 1)
(b) n/2
(c) n × n
(d) $\frac{n(n+1)}{2}$

CGL TIER II 2019

Q.35 Let ab, a ≠ b, is a Two-digit prime number such that ba is also a prime number. The sum of all such numbers?
(a) 374 (b) 418 (c) 407 (d) 396

Q.36 When positive no. a, b & c are divided by 13, the remainder are 9,7 and 10, respectively. What will be the remainder when (a + 2b + 5c) is divided by 13?
(a) 10 (b) 5 (c) 9 (d) 8

CGL PRE 2019

Q.37 What is the remainder when we divide $5^{70} + 7^{70}$ by 74?
(a) 7 (b) 1 (c) 0 (d) 5

CHSL 2020

Q.38 The value of $(a^{2/3} + 2a^{1/2} + 3a^{1/3} + 2a^{1/6} + 1)(a^{1/3} - 2a^{1/6} + 1) - a^{1/2}(a^{1/2} - 2)$, when a = 7?
(a) 7 (b) 0 (c) 1 (d) $\sqrt{7}$

Q.39 What is the least 5 digit number that is divisible by 91?
(a) 10010 (b) 10192 (c) 10283 (d) 10101

Q.40 What is the least number that should be added to the product 11×12×13×14 to make it a perfect square?
(a) 1 (b) 11 (c) 5 (d) 0

Q.41 How many numbers are there from 700 to 950 (including both) which are neither divisible by 3 nor 7?
(a) 107 (b) 141 (c) 144 (d) 145

CGL 2017

Q.42 How many times the keys of a typewriter have to be pressed in order to write numbers from 121 to 1346?
(a) 3675 (b) 4018 (c) 4021 (d) 4025

CGL 2017

Q.43 When 200 is divided by a positive integer X, the remainder is 8, how many values of X are there?
(a) 60 (b) 7 (c) 8 (d) 5

CGL 3 March 2020

Q.44 When a positive number is divided by d, the remainder is 15. When ten times of the same number is divided by d, the remainder is 6. The least possible value of d is?
(a) 9 (b) 16 (c) 18 (d) 12

CGL 5 March 2020

Q.45 The LCM of 165, 176, 385 & 495 is K, when K is divided by the HCF of the number, the quotient is P. What is the value of P?
(a) 3360 (b) 6720 (c) 5040 (d) 2520

CPO 13 Dec 2019

Q.46 If r is the remainder when each of 6454, 7306, & 8797 is divided by the greatest number d (d>1), then (d-r) is equal to?
(a) 126 (b) 64 (c) 137 (d) 149

CPO 13 Dec 2019

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SSC SELECTION PHASE IX

Q47. If the five-digit number 235xy is divisible by 3, 7 and 11, then what is the value of (x – y)?
(a) 6 (b) 4 (c) 5 (d) 2

Q48. If the 5-digit number 284xy is divisible by 3 and 77, then the value of (8x – y) is:
(a) 9 (b) 4 (c) 5 (d) 7

Q49. Find the largest value of k such that a 6-digit number 450k1k is divisible by 3.
(a) 7 (b) 6 (c) 8 (d) 9

CGL PRE 2021

Q50. If 8A5146B is divisible by 88, then what is the value of B – A?
a) 0 b) -1 c) 1 d) 2

Q51. A number 'n' when divided by 6 levers remainder 2. What will be the remainder when $(n^2 + n + 2)$ is divided by 6?
a) 4 b) 0 c) 2 d) 6

Q52. The least which should be added to 3627 so that the sum is exactly divisible by 4, 5, 6 and 8 is:
a) 39 b) 27 c) 93 d) 72

Q53. The distance between two towns is covered in 7 hours at a speed of 50 km/h. By how much should the speed (in km/h) be increased so that 2 hours of travelling time will be saved?
a) 70 b) 20 c) 30 d) 40

SSC MTS 2020

Q54. The difference between a positive number and its reciprocal increases by a factor of $\frac{175}{144}$ when the number is made to increase by 20% what is number?
(a) 6 (b) 7.5 (c) 5 (d) 2.5

Q55. Let x be the greatest number by which when 448, 678 and 908 are divided, the remainder in each case is 11. When 147 is divided by x, the remainder is:
(a) 4 (b) 3 (c) 5 (d) 9

Q56. The difference between a positive number and its reciprocal increases by a factor of 175/144 when the number is made to increase by 20%. What is the number?
(a) 6 (b) 7.5 (c) 5 (d) 2.5

CGL MAINS 2020

Q57. The value of $11.\overline{4} + 22.5\overline{67} - 33.5\overline{9}$ is:
(a) $40.\overline{12}$ (b) $4.\overline{12}$ (c) $0.4\overline{12}$ (d) $0.04\overline{12}$

Q58. $5^{71} + 5^{72} + 5^{73} + 5^{74} + 5^{75}$ is divisible by which of the following number?
(a) 71 (b) 69 (c) 89 (d) 73

Q59. Let p, q, r and s be positive natural numbers having three exact factors including 1 and the number itself. If q > p and both are two-digit numbers, and r > s and both are one-digit numbers, then the value of the expression $\frac{p-q-1}{r-s}$ is:
(a) –s-1 (b) s-1 (c) 1-s (d) s+1

CGL MAINS 2021

Q60. In the digits of a two digit number is reversed, then the number is decreased by 36. Which of the following is correct regarding the number?
1. The difference of the digits is 4.
2. The value of number can be 84.
3. Number is always a composite number.
a) II and III b) I, II and III
c) I and II d) I and III

Q61. x, y and z are distinct prime numbers where x < y < z. If x + y+ z = 70, then what is the value of z?
a) 43 b) 37 c) 3 d) 29

Q62. What is the sum of all the common terms between the given series S1 and S2?
S1 = 2, 9, 16,.....632
S2 = 7, 11, 15.....743
a) 6974 b) 6860 c) 6750 d) 7140

Q63. What is the value of $99\frac{11}{99} + 99\frac{13}{99} + 99\frac{15}{99} + \ldots\ldots + 99\frac{67}{99}$?
a) $\frac{94220}{33}$ b) $\frac{96220}{33}$ c) $\frac{97120}{33}$ d) $\frac{95120}{33}$

Q64. If lies $\sqrt[3]{N}$ between 6 and 7, where N is an integer then how many value of N can take?
a) 126 b) 128 c) 127 d) 125

Q65. How many numbers are there from 400 to 700 in which the digit 6 occurs exactly twice?
a) 19 b) 20 c) 18 d) 21

Q66. Which of the following given value is greater than $\sqrt[3]{12}$?
a) $\sqrt[12]{33214}$ b) $\sqrt[9]{1500}$
c) $\sqrt[6]{121}$ d) $\sqrt[5]{60}$

DP 2022

Q67. Find the smallest 5-digit number which when divided by 15, 20 and 25 leaves remainders 7, 12 and 17, respectively.
a) 10192 b) 10194 c) 10195 d) 10193

Q68. If the sum of all the prime numbers is 'x' and that of all the odd prime numbers is 'y', then what is the value of x – y?
a) 0 b) 2 c) ∞ d) 1

CPO PRE 2022

Q69. What are the value of R and M, respectively, if the given number is perfectly divisible by 16 and 11?
a) 4 and 6 b) 7 and 5 c) 5 and 5 d) 5 and 7

Q70. Two positive numbers differ by 3951. When larger number is divided by smaller number, the quotient is 12 and

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the remainder is 13. The sum of the digits of the larger number is:
a) 12 b) 16 c) 18 d) 14

Q71. Find the sum of the numbers between 550 and 700 such that when they are divided by 12, 16 and 24. Leave remainder 5 in each case.
a) 1980 b) 1887 c) 1860 d) 1867

Q72. The greatest four digit number which is exactly divisible by 15, 24 and 40 is:
a) 9960 b) 9940 c) 9990 d) 9980

Q73. If the 9-digit number 72x8431y4 is divisible by 36, what is the value of $\left(\frac{x}{y}-\frac{y}{x}\right)$ for the smallest possible value of y, given that x and y are natural numbers?
a) $1\frac{5}{7}$ b) $2\frac{1}{10}$ c) $1\frac{2}{5}$ d) $2\frac{9}{10}$

Q74. The sum of the odd divisors of 216 is:
a) 16 b) 14 c) 40 d) 600

CGL PRE 22

Q75. Which of the following statement is correct?
1. The value of $100^2 - 99^2 + 98^2 - 97^2 + 96^2 - 95^2 + 94^2 - 93^2 + \ldots + 22^2 - 21^2$ is 4840.
2.The value of $\left(k^2+\frac{1}{k^2}\right)\left(k-\frac{1}{k}\right)\left(k^4+\frac{1}{k^4}\right)\left(k+\frac{1}{k}\right)\left(k^4-\frac{1}{k^4}\right)$ is $k^{16}-\frac{1}{k^{16}}$.
a) Neither 1 nor 2 b) Only 2
c) Only 1 d) Both 1 and 2

Q76. What will be the remainder when $27^{27} + 27$ is divided by 28?
a) 28 b) 27 c) 25 d) 26

Q77. Any six-digit number that is formed by repeating a three-digit number, is always divisible by:
a) 111 b) 1001 c) 19 d) 101

Q78. If the seven-digit number 52A6B7C is divisible by 33, and A, B, C are primes, then the maximum value of 2A + 3B +C is:
a) 32 b) 23 c) 27 d) 34

Q79. If the 8-digit number 123456xy is divisible by 8, then the total possible pairs of (x, y) are:
a) 8 b) 13 c) 10 d) 11

CHSL PRE 22

Q80 What is the value of the expression 1 – 2 + 3 – 4 + 5 – 6 ..... to 100 terms?
a) -50 b) -60 c) -49 4) -55

Q81 What is the total number of factors of the number 720 except 1 and the number itself ?
a) 29 b) 27 c) 32 d) 28

Q82. What is the sum of all three digit numbers which are divisible by 15 ?
a) 32850 b) 36825 c) 41200 d) 28750

Q83. What is the sum of the largest and the smallest of the given fractions ?
$\frac{6}{5}, \frac{11}{15}, \frac{4}{7}, \frac{5}{13}$
a) 94/65 b) 61/65 c) 97/65 d) 103/65

Q84. What is the value of $(2^1+1)(2^4+1)(2^8+1)(2^{16}+1)\ldots\ldots\ldots(2^{128}+1)$?
a) $2^{256}-1$ b) $\frac{2^{256}-1}{3}$
c) $\frac{2^{256}-1}{2}$ d) $\frac{2^{256}-1}{4}$

Q85. The product of two consecutive prime numbers is 7387. What is the difference of the two numbers ?
a) 3 b) 6 c) 2 d) 4

Q86. If the 4-digit number 48ab is divisible by 2, 5 and 7 then what is the value of (10a – b)?
a) 10 b) 20 c) 30 d) 0

Q87. What is the sum of all two digit odd numbers?
a) 2325 b) 2475 c) 2425 d) 2375

Q88. What is the sum of all three digits numbers which is divisible by 20?
a) 21400 b) 22500
c) 24300 d) 25800

Q89. If sum of squares of two real numbers is 12 and he product of the numbers is 4, find the difference between the numbers?
a) 4 b) 8 c) 2 d) 1

Q90. If the sum of three consecutive composite numbers is 36, then what is the product of the three numbers?
a) 1460 b) 1750 c) 1820 d) 1680

ICAR & Selection Phase IX

Q91 Which is the one of the following number resultant of multiplication, addition and subtraction of the same number?
1. 481 2. 488 3. 492 4. 484

Q92 Find the least value of K for which 7864K3 is divisible by 7.
1. 2 2. 5 3. 1 4. 4

Q93 The six-digit number 7x1yyx is a multiple of 33 for non-zero digits x and y, which of the following could be a possible value of (x + y)?
1. 4 2. 5 3. 2 4. 3

CGL PRE 23

Q94 A and B have some toffees. If A gives one toffee to B, then they have equal number of toffees. If B gives one toffee to A, then the toffees with A are double with B. The total number of toffees with A and B are _____.
1. 12 2. 10 3. 14 4. 15

Q95 During a division, Pranjal mistakenly took as the dividend a number that was 10% more than the original dividend. He

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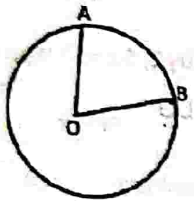
also mistakenly took as the divisor a number that was 25% more than the original divisor. If the correct quotient of the original division problem was 25 and the remainder was 0, what was the quotient that Pranjal obtained, assuming his calculations had no error?
1. 21.75 2. 21.25 3. 28.75 4. 22

Q96 The square of the sum of two given natural numbers is 784, while the product of the two given numbers is 192. Find the positive difference between the squares of these two given numbers.
1. 512 2. 122 3. 400 4. 112

Q97 In the given figure, the length of arc AB is equal to 3 times radius r of the circle.



Find the area of sector OAB in terms of radius r.
1. $1.5r^2$ 2. $2.5r^2$ 3. $\frac{1}{2}r^2$ 4. $3r^2$

Q98 Find the remainder when $8^8 + 6$ is divided by 7.
1. 0 2. 2 3. 3 4. 1

Q99 A four-digits number abba is divisible by 4 and a<b. How many such numbers are there?
1. 10 2. 8 3. 12 4. 6

Q100 The difference between the cubes of two given natural numbers is 6272, while the positive difference between the two given numbers is 8. What is the sum of the cubes of the two given numbers?
1. 9728 2. 9684 3. 8000 4. 9600

CHSL PRE 23

Q101. The remainder of the term $9 + 9^2 + ... + 9^{(2n+1)}$ when divided by 6 is:
1. 2 2. 1 3. 4 4. 3

Q102. The sum of the cubes of two given numbers is 10234, while the sum of the two given numbers is 34. What is the positive difference between the cubes of the two given numbers?
1. 8602 2. 3484 3. 3488 4. 3356

Q10. The six-digit number N = 4a6b9c is divisible by 99, then the maximum sum of the digits of N is:
1. 27 2. 36 3. 18 4. 45

Q104. When P is subtracted from each of the numbers 8, 6, 2 and 9, the numbers so obtained in this order are in proportion, what is the mean proportional between (3P – 6) and (9P – 4)?
1. 29 2. 28 3. 24 4. 26

Q105. The divisor is 10 times the quotient and 5 times the remainder in a division sum. What is the dividend if the remainder is 46?
1. 5336 2. 4286 3. 5972 4. 4874

Q106. What is the least number that must be added to the greatest 6-digit number so that the sum will be exactly divisible by 294?
1. 194 2. 269 3. 234 4. 189

Q107. What is the remainder when 3^8 is divided by 7?
1. 4 2. 2 3. 5 4. 6

CGL MAINS 23

Q108. The cost of 2 pencils and 3 pens is ₹55 and the cost of 7 pencils and 2 pens is ₹65. What is the total price (in ₹) of one pen and one pencil?
(a) 12 (b) 20 (c) 15 (d) 25

Q109. 3. A six-digit number 11p9q4 is divisible by 24. Then the greatest possible value for pq is:
(a) 32 (b) 56 (c) 68 (d) 42

SELCTION PHASE XII

Q110. If the 6 digit number 7002 * 4 is completely divisible by 8, then the smallest integer in place of * will be:
a) 6 b) 0 c) 4 d) 2

Q111. Which of the following numbers will completely divide $4^{12} + 4^{13} + 4^{14} + 4^{15}$?
a) 3 b) 17 c) 11 d) 7

Q112. If the six-digit number 15x1y2 is divisible by 44, then the minimum value of (x + y) is equal to:
a) 8 b) 6 c) 5 d) 7

Q113. A 4-digit number '34PQ' divisible by 3,5 and 7. Find the value of P+Q.
a) 12 b) 10 c) 13 d) 11

Q114. A number when divided by a divisor leaves a remainder of 24. When twice the original number is divided by the same divisor, the remainder is 13. What is the value of the divisor?
a) 25 b) 35 c) 30 d) 37

CHSL 2024

Q115. If 3c2933k is divisible by both 5 and 11, where c and k are single digit natural numbers, then c + k = _____.
a) 7 b) 8 c) 6 d) 5

Q116. After the division of a number successively by 2,3 and 5, the remainders are 1,2 and 3, respectively. What will be the remainder, if 13 divides the same number (if the last quotient is 1)?
a) 1 b) 2 c) 0 d) 4

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Q117. K being any odd number greater than 1, $k^{22} - k$ is always divisible by:

a) 24 b) 15 c) 13 d) 5

Q118. How many factors of 14,400 are divisible by 18 but not by 36?

a) 5 b) 2 c) 4 d) 3

Q119. The sum of the digit of a two-digit number is 9. The number obtained by interchanging its digit exceeds the given number by 45, then the original number is :

a) 18 b) 36 c) 54 d) 27

Q120. An 8 digit number is divisible by 99. If the digits are shuffled, then the number is always divisible by _____.

a) 6 b) 9 c) 5 d) 1

Q121. If 6, 18, x are sides of a triangle and x is an integer, then the number of possible value of x is:

a) 11 b) 15 c) 13 d) 14

Q122. The sum of the five consecutive even numbers is 2720. The sum of the third and fifth numbers is:

a) 1192 b) 1292 c) 1092 d) 1392

Q123. If two numbers are each divided by the same divisor, then the remainder are 6 and 7, respectively. If the sum of the two numbers be divided by the same divisor, then the reminder is 5. The divisor is:

a) 6 b) 8 c) 13 d) 4

Q124. Find the number when successively divided by 3,5and 7 leaves remainder 2,1and 3, respectively, and the last quotient is 3.

a) 360 b) 362 c) 365 d) 367

CGL 2024

Q125. If m is even, then $(8^m - 1)$ is divisible by:

a) 63 b) 42 c) 65 d) 8

Q126. Find the quotient, when the mean proportional of $7\frac{1}{5}$ and 245 is divided by an even prim number.

a) 21 b) 49 c) 42 d) 36

Q127. If the 9-digit number 5x79586y6 is divisible by 36, then what is the negative value of $\sqrt{(2x+y)}$ for the largest possible value of y, given x and y are natural numbers?

a) -7 b) -2 c) - 4 d) -5

Q128. A number whose fifth part increased by S is equal to its third part decreased by 7. Find half of the number.

a) 60 b) 45 c) 80 d) 150

Answers

1	C	2	A	3	c
4	B	5	A	6	A
7	C	8	B	9	D
10	D	11	B	12	A
13	A	14	A	15	B
16	A	17	C	18	D
19	C	20	C	21	C
22	D	23	A	24	C
25	C	26	D	27	D
28	C	29	D	30	C
31	C	32	D	33	C
34	C	35	B	36	D
37	C	38	C	39	A
40	A	41	C	42	D
43	C	44	B	45	C
46	D	47	B	48	C
49	A	50	C	51	C
52	C	53	B	54	C
55	D	56	C	57	C
58	A	59	A	60	C
61	B	62	A	63	D
64	A	65	B	66	A
67	A	68	B	69	C
70	B	71	B	72	A
73	B	74	C	75	C
76	D	77	B	78	B
79	B	80	A	81	D
82	A	83	D	84	B
85	B	86	C	87	B
88	C	89	C	90	D
91	D	92	D	93	B
94	A	95	D	96	D
97	A	98	A	99	B
100	A	101	D	102	B
103	A	104	B	105	A
106	D	107	B	108	B
109	B	110	D	111	B
112	D	113	D	114	B
115	C	116	A	117	A
118	D	119	D	120	B
121	A	122	C	123	B
124	C	125	A	126	A
127	D	128	B		

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1.

No. 30a68b

$(3+a+8)-(0+b+6)=11$

To find maximum value of b; 'a' should be maxm too, b'coz $a>b$

Maximum value that 'a' can take is 9.

$20-(b+6)=11$

$b+6=9$

$b=3$

2.

HCF of 5, 35, 39 and 65 is 1365.

Largest five digit no. is 99999

Multiple of 1365 which is close to 99999 is 99645

$\frac{99999}{1365} = 73.259$

Thus no. close to 99999 is 1365×73.

Digit sum $= 9+9+6+4+5$

$= 18+15$

$= 33$

3.

A no. which is divisible by 7, 11 & 13 is in the form of xyzxyz.

8 2 3 P 2 Q

$\downarrow$ $\downarrow$

8 3

$P-Q = 8-3 = 5$

4.

Number = 54K31M82

$(5+K+1+8)$ & $(4+3+M+2)$

$\downarrow$ $\downarrow$

$(14+K)$ $(9+M)$

To find the max^m value of $(K+M)$. The difference b/w these two terms should be minimum.

Also, the no. will be divisible by 11 only if the diff b/w these two terms is either 0 or 11. We have to take minimum difference so.

$(14+K)-(9+M)=0$

$14+K = 9+M$

$M-K=5$

Take max^m value for m i.e. 9

$9-K=5$

$K=4$

$M+K = 9+4 = 13$

5.

672xy.

Assume the values of x & y be max^m i.e $x=y=9$

The no. will be 67299.

Now we have to find no. which is closte to 67299 which is a multiple of HCF of 3, 7 & 11

HCF = 231

$231 \overline{)67299}(291$

$\underline{67221}$

78

These 2 digits will be the values of x & y

Now $x=2$ & $y=1$

$6x+5y = 6\times2+5\times1$

$= 12+5 = 17$

6.

87m6203m

Digit sum = 26 + 2m

For a number to be divisible by 6 its digit sum should be a multiple of 3, and the last digit should be an even number.

Thus m can take only even values viz. 2, 4, 6, 8

Now $26+2\times2 = 30$ ✓

$26+2\times4 = 32$ ✗

$26+2\times6 = 38$ ✗

$26+2\times8 = 42$ ✓

Possible values of m are 2 and 8 only.

Sum $8+2=10$

7.

As per 2nd statement. The Quotient when divided by 7 leaves remainder 5.

Quotient $= 7x+5$

According to 1st statement the Quotient when multiplied by 3, leaves remainder 2.

$3(7x+5)+2 =$ Actual No.

$21x+15+2 = 21x+17$

$\frac{\text{Actual No.}}{21} = \frac{21x}{21} + \frac{17}{21}$

$\downarrow$ Rem 0 $\downarrow$ Rem 17

8.

243 → Digit sum → $2+4+3=9$

The largest 5-digit number should also be divisible by 9.

Only option B is divisible by 9.

Basic Method:

Largest 5 digit no.

$= 999999$

$\frac{999999}{243} = \underbrace{243\times4115}_{999,945}+54$

9.

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$(a-b)=5$

$a^3-b^3=1850$

$(a^3-b^3)=(a-b)[(a-b)^2+3ab]$

$1850=5(25+3ab)$

$3ab=345$

$ab=115$

Now $a+b=\sqrt{(a-b)^2+4ab}$

$=25+460$

$=\sqrt{485}$

$a^2-b^2=(a+b)(a-b)$

$=5\times\sqrt{485}$

$=5\sqrt{485}$

10.

A9256B784

(22+B) (19+A)

1st case: when diff is equal

$22+B=19+A$

$A-B=3$

IInd case: when diff is 11

$(A+19)-(B+22)=11$

$A-B=3$

3rd case: when diff is 11

$(B+22)-(A+19)=11$

$A-B=-8$

11.

$a+b=59$ and $ab=1150$

$a^2+b^2=(a+b)^2-2ab$

$=(59)^2-2\times1150$

$=3481-2300$

$=1181$

12.

For a number to be divisible by 5 the last digit should be either 5 or 0. But this number is divisible by 8 as well so last digit can take only one value i.e. 0.

This means $y=0$.

If we look at the options only A and C has $y=0$.

Now if we check A & C both. The last 3 digits will be

A → 760 $(760\div8=95)$

B → 720 $(720\div8=90)$

Both are divisible by 8 but the value is maximum in option A.

13.

For a number to be divisible by 5, 8 both its last digit should be 0.

Thus $B=0$

Digit sum of $n=4+7+5+A+0$

$=7+A=9$

$A=2$

$10A+B$

$=10\times2+0$

$=20$

14.

If a number is divisible by 125, its last 3 digits should be

125, 250, 375, 500, 625, 750, 875, 000

Now the number 537xy5 has 5 as its unit digit. So possible last 3- digits are

125, 375, 625, 875

Only 4 such six-digit numbers are there.

15.

6892 7105 7531

213 426

213

Largest no. $X=213$

$6892=213\times32+76$

$7105=213\times33+76$ → $Y=76$

$7531=213\times35+76$

$X-Y=213-76=137$

16.

$\frac{a}{d}=\frac{3}{4}\times\frac{4}{5}\times\frac{5}{6}=\frac{3}{6}=\frac{1}{2}$

$\left(\frac{a}{d}\right)^{10}\cdot\left(\frac{1}{2}\right)^{10}=\frac{1}{1024}$

Sum of co-primes

$=1+1024=1025$

17.

The unit digit of a perfect square can be 2, 3 or 8. So option 4 is not possible.

$\sqrt{1250.49}=35.362268\ldots$

$\sqrt{6250.49}=79.0600\ldots$

$\sqrt{1354.24}=36.8$

↓

Square root of this no. is non-recurring

18.

LCM of 15, 18, 42 = 630

Now $630x+8$ is divisible by 13

$\frac{630x+8}{13}=\frac{624x}{13}+\frac{6x+8}{13}$

↓ completely divisible

$\frac{6x+8}{13}$ → Put $x=3$

$\frac{26}{13}$ → completely divisible

Actual No. $=630\times3+8=1898$

Digit sum = 26

Short-cut

The question says that the no. when divided by 18 leaves remainder 8.

It means if we subtract 8 from the digit sum of actual number the resultant should be either 0 or a multiple of 9.

Now 26 - 8 = 18 (multiple of 9).

Only option D follows.

19.

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No.s less than 1000 divisible by 5 → 5, 10, 15 995
= 199

No.s less than 1000 divisible by 7 → 7, 14, 21 994
= 142 no.s

No.s less than 1000 divisible by 35 = 35, 70, 105 980
= 28.

Now these 28 multiples of 35 are then in multiples of 5 & 7 both
Thus these have to be subtracted twice.

Total Numbers = 199 + 142 − 2(28)
= 341 − 56
= 285

20.

$\sqrt{0.6912} = \frac{48\sqrt{3}}{100}$

$\sqrt{0.5292} = \frac{42\sqrt{3}}{100}$

$\Rightarrow \frac{\frac{48\sqrt{3}}{100} + \frac{42\sqrt{3}}{100}}{\frac{48\sqrt{3}}{100} - \frac{42\sqrt{3}}{100}} = \frac{48+42}{48-42}$

$= \frac{90}{6} = 15$

21.

$200 - 8 = 192$

$192 = 2^6 \times 3$

Total factors of 192 = (6+1)(1+1)
= 7×2
= 14

We have to subtract factors of 192 which are less than 8.
i.e. 1, 2, 3, 4, 6, 8. 6 factors

Possible values of x = 14 − 6
= 8

22.

Let the number be 10x+y

ATQ $\frac{x+y}{10x+y} = \frac{1}{7}$

$7x + 7y = 10x + y$

$3x = 2y$

$\frac{x}{y} = \frac{2}{1}$

2 (Tens) 1 (Unit)

1 → 4
2 → 8

Actual No. is 84
On reversing 48

$\frac{48}{7} = 7 \times 6 + \ldots$

Remainder 6

23.

LCM of 15, 18, 20 and 27
= 540

Now $\frac{540x+10}{31}$

$= \frac{527x}{31} + \frac{13x+10}{31}$

↓ Completely Divisible

$\frac{13x+10}{31}$ → Put x = 4

$\frac{13\times4+10}{31} = \frac{62}{31}$ → Divisible, x = 4 satisfies

Actual Number = 540×4 + 10
= 2170

Square close to 2170 = 47^2
= 2209

Thus least no. to be added

2209 − 2170 = 39

24.

Unit Digit of $3^{61284} = 3^4 = 1$

This clearly implies when 3^{61284} when divided by 5 will give remainder 1.

Now $4 \div 6$ remainder is 4
$4^2 \div 6 \rightarrow$ remainder = 4
$4^3 \div 6 \rightarrow$ remainder = 4
$4^n \div 6 \rightarrow$ remainder = 4
$\therefore 4^{96} \div 6 \rightarrow$ remainder = 4

Now x = 1 & y = 4

$(2x - y) = 2x - 4$
$= -2$

25.

Dividend = Divisor × Quot + Remainder

$17 \times 2 + 0 = 34$
$34 \times 11 + 17 = 391$
$391 \times 1 + 34 = 425$

The two numbers are 391 and 425

Sum: 391 + 425
= 816

26.

$(a^n + b^n)$ is divisible by $(a+b)$ if 'n' is odd

Thus $(127^{97} + 97^{97})$ is divisible by $(127 + 97) = 224$

Now $\frac{224}{32} = 7$. Remainder is 0

27.

Assume longer no. = L
Smaller no. = S

ATQ $9S + 41 = L$
$L - S = 2001$

$8S + 41 = L - S$
$8S + 41 = 2001$
$8S = 1960$
$S = 245$
$L = 245 + 2001$
$= 2246$

Digit Sum = 14

28.

$\frac{10,000}{327} = 30.58$ ↓

We will take next integer value b'coz we have to find number greater than 10,000.

$327 \times 31 = 10137$

Least no. to be added = 10137 − 10000
= 137

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29.

Divisor	Quot	Remainder
3	155	
4	51	2
7	12	3
	0	5

The no. is 155

Now $\frac{155}{42} = 42 \times 3 + 29$ ↓ Remainder

30.

$(2x-3y)^2$

$= 4x^2 + 9y^2 - 12xy$

31.

For a number to be divisible by 8, last digit should be an even number. So N cannot be odd. Option B is not possible

Now consider the last 3 digits of this number 67N.

A) 676 → No divisible by 8

) 672 → Completely divisible

674 → Not divisible by 8

Only option C is possible

32.

$2^{18} - 1 = (2)^{3^6} - 1 = 8^6 - 1^6$

Now $a^n - b^n$ is divisible by $(a-b)$ when n is even

So $8^6 - 1^6$ is divisible by $(8-1) = 7$

33.

$x^2 - 1 = 0$; $x^2 = 1$ or $x = 1$

Put $x = 1$ in the above eqn

$1 + 2 - a - b = 0$

$a + b = 3$

Now go through options.

Only option C has $a + b = 3$

34.

$S_n = \frac{n}{2}$ [1st term + last term]

$= \frac{n}{2}[1 + 2n - 1]$

$= \frac{n}{2} \times 2n$

$= n \times n$

35.

The list of all such prime numbers is

13, 31, 17, 71, 37, 73, 79, 97

The sum of all these prime numbers will be

$13 + 31 + 17 + 71 + 37 + 73 + 79 + 97$

$= 418$

36.

$a + 2b + 5c = (9 + 7 \times 2 + 5 \times 10)$

$= 9 + 14 + 50$

$= 73$

Now $\frac{73}{13} = 13 \times 5 + 8$ ↓ Option D

37.

$5^{70} + 7^{70}$

$= (5^2)^{35} + (7^2)^{35}$

$= 25^{35} + 49^{35}$

$a^n + b^n$ is divisible by $(a+b)$ if n is odd.

So $25^{35} + 49^{35}$ is divisible by $25 + 49 = 74$

Therefore the remainder will be 0.

38.

Put $a^{1/6} = k$

Then the given equation will be

$k^6 + 2k^5 + 3k^4 + 2k^3 + k^2 - 2k^5 - 4k^4 - 6k^3 - 4k^2 - 2k + k^4 + 2k^2 + 3k^2 + 2k + 1 - k^6 + 2k^3$

$= 1$

Alternate:

The equation given in the question is a theorem and it will give the same result, no matter what value is substituted in place of 'a'.

So whatever the case is, final answer will always be 1

39.

Least 5 digit number $= 10,000$

$\frac{10,000}{91} = \frac{109.89}{\downarrow}$ For multiple, take next integer value

$91 \times 110 = 10010$

40.

Concept used

If 4 nos are in AP

Then

$1^{st} \times 2^{nd} \times 3^{rd} \times 4^{th} + (\text{diff})^4$

$= (1^{st} \times 4^{th})^2$

Now

$11 \times 12 \times 13 \times 14 + 1^4$

$= (11 \times 14)^2$

$= 24025$

Thus no. to be added

$= 1^4 = 1$

41.

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Numbers divisible by 3
702, 705 948
= 33 numbers

Numbers divisible by 7
707, 714 945
= 35 numbers

Numbers divisible by 7×3=21
= 714, 735 945
= 12 numbers

Total numbers divisible
= 33+35-12
= 118-12 = 106

Numbers not divisible
= (950-700) - 106
= 250-106 = 144 Option c

42.

Total 3-digit numbers from 121-999 = (999-121+1)
= 879

Total 4 digit numbers from 1000-1346 = (1346-1000+1)
= 347

Total no. of key depressions
= 879×3 + 347×4
= 4025

43.

200-8 = 192

$192 = 2^6 \times 3$

Total factors of 192:
(6+1)×(1+1) = 7×2 = 14

In order to get remainder 8 all factors of 192, which are less than 8 have to be subtracted.

Factors of 192 less than 8 are 1, 2, 4, 8, 3, 6

Values x can take = 14-6 = 8 Option c

44.

The remainder is 15, so dividend must be greater than 15.

Only 2 options 16 and 18 are possible. We will check 16 first.

At 16 the minimum value of the number will be

16+15 = 31

10 times the number = 31×10
= 310

$\frac{310}{16} = 16 \times 19 + 6$

Both conditions are satisfied

∴ least possible value of D is 16

45.

LCM of 165, 176, 385, 495

K = 112×45×11

HCF = 11

$P = \frac{K}{HCF} = \frac{112 \times 45 \times 11}{11} = 112 \times 45$
$= 5040$

46.

6454 7306 8797

852 1491

639

639 = 213×3 ; HCF = 213

$\frac{6454}{213} = 213 \times 3 + 64$ → Remainder

D-r = 213-64 = 149

47.

Put x=y=9 (max^m value)

231 | 23599 | 102
231
499
462
37

Subtract 37 from 99

99-37 = 62

x=6

y=2

x-y = 4

48.

Put max^m value of x=y=9

231 | 28499 | 123
231
539
462
779
693
86

99-86 = 13

x=1 y=3

8x-y = 8-3 = 5

49.

Digital sum of the number should be a multiple of 3.

10+2k

x=9 → 10+18 = 28 ✗

x=8 → 10+16 = 26 ✗

x=7 → 10+14 = 24 ✓

50.

Last 3 digits = 46B

For this number to be divisible by 8, B should be 4.

8A51464

21 (7+A)

21-(7+A) = 11

7+A = 10

A=3 ; B=4

B-A = 1

51.

(n^2+n+2)

Put n=2

(2^2+2+2)

= 8

$\frac{8}{6} = 6 \times 1 + 2$

↓ Remainder

52.

Shortcut,

According to the question the final number should be divisible by 5. The number will be divisible by 5 only if the unit digit of that no. is 0 or 5.

If we add each option to 3627 one by one option, C = 93 will give unit digit 0.

Basic

LCM of 4, 5, 6, 8 is 120

Now 3627+x should be a multiple of 120

3627 = 3600 + 27

Now $\frac{3600 + 27 + x}{120}$ will give 27+x as remainder

x should be 120-27 = 93

53.

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	Old	New
Time	7	5
Speed	5	7

5 — 50 km/h
7 — 70 km/hr

Increase : 70-50 = 20

54.

Let the number be 5x

$$\frac{6x-\frac{1}{6x}}{5x-\frac{1}{5x}} = \frac{175}{144}$$

$$\frac{(36x^2-1)\times 5}{(25x^2-1)\times 6} = \frac{175}{144}$$

$$864x^2-24 = 875x^2-35$$

$$11x^2 = 11,\ x = 1$$

$5x = 5\times 1 = 5$ Option C

55.

448 678 908
− 11 − 11 − 11
437 667 897
230 230

230 = 23 × 10

Thus the HCF is 23

Now $\frac{147}{23} = 23\times 6 + 9$

Remainder 9

56. Same as question no. 77.

57.

A = 11.$\overline{4}$ = 11.44444

B = 22.56$\overline{7}$ = 22.56767

C = 33.5$\overline{9}$ = 33.59999

A + B − C

11.44444
22.56767
34.01211
− 33.59999
0.41212 → = 0.4$\overline{12}$

58.

$5^{71}+5^{72}+5^{73}+5^{74}+5^{75}$

$= 5^{71}(1+5+5^2+5^3+5^4)$

$= 5^{71}\times 781$

$= 5^{71}\times 11\times 71$

↓

Option A

59.

Only the square of prime numbers will satisfy this condition.

So Q = 7^2 = 49
P = 5^2 = 25
R = 3^2 = 9
S = 2^2 = 4

$$\frac{P-Q-1}{R-S} = \frac{25-49-1}{9-4}$$

$$= -5$$

$-5 = -4-1 = -5-1$

60. If a two digit number is reversed, then the difference between the old number & the new number is 9X difference between the digits.

Here 9X diff = 36
Diff b/w digits = $\frac{36}{9}$ = 4
Therfore 1st condition is true.

(ii) 84 ⇒ 8 − 4 = 4
So the number can be 4.

(iii) A composite number is one which has exactly 3 factors. But 84 is not a composite number, so this condition will not remain true in all cases.

Only 1st and 2nd follows

61.

$\frac{70}{2}$ = 35; Prime number close to 35 is 37.

Now remaining 70 − 37 = 33

33
2 + 31

x = 2 y = 31 z = 37 x < y < z

62.

S_1 → 2, 9, 16 632
common difference = 7

S_2 → 7, 11, 15 - - - - 743
common difference = 4

LCM of 7 & 4 = 28
First common term = 23
Common terms will form an AP with common difference 28

$T_n \le 632$

$28n-5 \le 632$
$28n \le 637$
$n \le 22$
$n = 22$

$S_n = \frac{n}{2}[2a+(n-1)d]$
$= 11[2\times 23 + 21\times 28]$
$= 11\times 634$
$= 6974$

63.

No. of terms = $\frac{67-11}{2}+1$
= 29 terms

$99\times 29 + \left[\frac{11}{99}+\frac{13}{99}\text{ - - - }\frac{67}{99}\right]$

$99\times 29 + \frac{29}{2}\left[\frac{67+11}{99}\right]$

$29\left[99+\frac{39}{99}\right]$

$= \frac{285360}{99} = \frac{95120}{33}$ Option D

64.

$6^3 = 216$ and $7^3 = 343$

This clearly implies that all

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integers b/w 343 and 216 will have cube roots b/w 6 and 7

Therefore

$N = (343-216) - 1$

1 is subtracted because we have to find integers b/w 343 and 216, but if we subtract (343-216) 343 won't be excluded, so to exclude it 1 has been subtracted

$(343-216)-1$

$= 126$

65.

Basic

400-499	500-599	600-699	
↓	↓	↓	
466	566	606	660
		616	661
		626	662
		636	663
		646	664
		656	665
		×666	666×
		676	667
		686	668
		696	669
$\overline{1}$ +	$\overline{1}$ +	$\overline{9}$ +	$\overline{9}$

= Total 20 numbers.

Using Permutations

$\overline{4,5,6}$ $\overline{0-9}$ $\overline{0-9}$

1 $\underline{6}$ $\underline{6}$ $\underline{9}$-options $= 1\times1\times9 = 9$

2 $\underline{1}$ (2 options) $\underline{6}$ $\underline{6}$ $= 2\times1\times1 = 2$

3 $\underline{6}$ $\underline{1}$ $\underline{6}$ (9 options) $= 1\times9\times1 = \underline{9}$

$\underline{20}$

66.

Using options

1 $\sqrt[3]{12}$ & $\sqrt[12]{33214}$

LCM of 3 & 12 is 12

$12^{\frac{1}{3}\times12}$ & $33214^{\frac{1}{12}\times12}$

12^4 & 33214^1

↓ ↓

20736 33214

$33214 > 20736$

67.

As per the question, if we subtract 12 from the answer it should be divisible by 20. A no. divisible by 20 has 0 as its unit digit.

Now if we look at the options only option A will give us a multiple of 20 if we subtract 12 from it.

$10192 - 12$

$2-2=0$

68.

x = Sum of all prime no.s including 2.

$2+a \rightarrow$ where a is the sum of all primes except 2.

Y = a → all prime no.s except 2, are odd primes.

69.

Last 4-digits 30M6

at M=5, the number will be divisible by 16.

34R0503056

3+R+5+3+5 4+0+0+0+6

↓ ↓

$(16+R) - 10 = 11$

$16+R = 21$

$R = 5$

$M=5,\ R=5$

70.

Assume larger no. = L

Smaller no. = S

ATQ : $L = 12S+13$

and $L-S = 3951$

$L-S = 11S+13$

$11S+13 = 3951$

$11S = 3938$

$S = 358$

$L = 12S+13$

$L = 12\times358+13$

$= 4309$

Digit sum = 16

71.

LCM of 12, 16, 24 = 48

Multiples of 48 b/w 550 and 700 which leaves remainder 5 are:

$48\times12+5 = 581$

$48\times13+5 = 629$

$48\times14+5 = \underline{677}$

$\underline{1887}$

72.

The number is divisible by 15 and 24. So, check divisibility rule for 3 and 8.

B and D are eliminated as the digital sum ≠ 3 or a factor of 3.

C will also be eliminated b'coz last 3 digits are not divisible by 8.

Option A follows all the conditions.

73.

$36 = 9\times4$

For 4 last 2 digits i.e. Y4 should be divisible by 4.

at Y = 2 (minimum), this no. will be divisible by 4.

72×843124

Digit Sum: $31+x$

or $4+x=9$

$x=5$

$\left(\frac{x}{y}-\frac{y}{x}\right) = \frac{5}{2}-\frac{2}{5} = 2\frac{1}{10}$ (B)

74.

$216 = 2^3\times3^3$

Sum of odd divisors

$= 2^0(3^0+3^1+3^2+3^3)$

$= 1\times40 = 40$

75.

$100^2-99^2+98^2-97^2 \ldots\ldots 22^2-21^2$

$(100+99)(100-99)+(98+97)(98-97)\ldots$

$\ldots(22+21)(22-21)$

$199+195+191 \ldots\ldots 43$

No. of terms = $\frac{1^{st}\text{ term} - \text{Last term}}{\text{Diff}}$

$= \frac{199-43}{4}+1$

$= 39+1 = 40$

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$\text{sum} = \frac{n}{2}[a+l]$

$= \frac{40}{2}[199+43]$

$= 20[242]$

$= 4840$

Statement 1 is true

$\left(k^2+\frac{1}{k^2}\right)\left(k-\frac{1}{k}\right)\left(k+\frac{1}{k}\right)\left(k^4+\frac{1}{k^4}\right)\left(k^4-\frac{1}{k^4}\right)$

$\left(k^2+\frac{1}{k^2}\right)\left(k^2-\frac{1}{k^2}\right)\left(k^8-\frac{1}{k^8}\right)$

$\left(k^4-\frac{1}{k^4}\right)\left(k^8-\frac{1}{k^8}\right) \neq k^{16}-\frac{1}{k^{16}}$

Statement II incorrect

76.

$27^{27}+27 = (28-1)^{27}+(28-1)$

Now $\frac{(28-1)^{27}}{28} + \frac{(28-1)}{28}$

$-1^{27} + -1$

Rem $= -1-1 = -2$ or $(28-2) = 26$

77.

Any six digit number which is formed by repeating three digits abcabc is always divisible by 1001

78.

Digit sum $= 20+A+B+C$

Possible values of $(A+B+C)$

1, 4, 7, 10, 13, 16, 19, 22, 25

For divisibility by 11

$[5+A+B+C]-(2+6+7)=0$

$A+B+C=10$

5, 3 and 2 are the prime no.s which can give sum 10.

Max^m value of $2A+3B+C$

$2A+3B+C$ will be max^m at $A=3$ $B=5$ and $C=2$

[Assign max^m variable to max^m constant]

Like max^m constant is with B so assign $B=5$ and so on.

$2A+3B+C$

$= 2\times3+3\times5+2$

$= 23$

79.

$123456xy$

For divisibility by 8, last 3 digits should be considered

$6xy$

put max^m and min^m values of x and y i.e 00 and 99

600 ——— 699

Calculate the multiples of 8 b/w these 2 numbers including 600 and 699

1st multiple 600

last multiple 696

Total multiples $= \frac{696-600}{8}+1$

$= 12+1$

$= 13$

80. Odd No. Series 1,3.....99

Even No. Series -2, -4, -6 ..... -100.

$50\times\frac{[99+1]}{2} - \frac{50[100+2]}{2}$

$50[50] - 50[51]$

$= -50$ (Ans)

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Second Method

$\underbrace{1-2}_{-1}+\underbrace{3-4}_{-1}+\underbrace{5-6}_{-1} - \cdots\cdots \underbrace{100}_{-1}$

$= -50$

81.

$720 = 2^4\times5^1\times3^2$

$= 5\times2\times3$

Total Factor = 30

Remove 720 & 1 => 30-2 = 28.

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82.

Three digit Number sum is divisible by 15.

First No. = 105

Last No. = 990

Total Terms $= \frac{990-105}{15}+1 = 60$

Numbers

Sum $= \frac{990+105}{2}\times60 = 32850$

83.

$\frac{6}{5}+\frac{5}{13}$

$\frac{103}{65}$

84.

$\frac{(2^2-1)(2^2+1)\cdots\cdots}{(2^2-1)}$

$\frac{(2^4-1)(2^4+1)\cdots\cdots}{3}$

$\Rightarrow \frac{2^{256}-1}{3}$

85.

$7387 = \underbrace{83\times89}_{6}$

To think first brake the no in two part that product is approx the no.

86.

$48ab$ —— 2, 5, 7

$b = 0, 5$ — not possible for 2

$b = 0$

$a = 2, 4, 6, 8, 3, 5, 7$

$\frac{48a}{7} = 420+\frac{60+9}{7} = \frac{56+4+9}{7}$

$a = 3$

$(10a-b) = 30-0 = 30$

87.

$11+13+15+\cdots\cdots 99$

$n = \frac{99-11}{2}+1 = 45$

$S_n = \frac{45}{2}[11+99]$

$= 45\times55$

$= 2475$

88.

$100+120+\cdots\cdots 980$

$n = \frac{980-100}{20}+1$

$n = 45$

$S_n = \frac{45}{2}[100+980]$

$= 45\times540$

$= 24300$

89.

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$a^2+b^2 = 12$
$ab = 4$
$(a-b)^2 = 12 - 2\times4$
$= 4$
$a-b = 2$

90.

36
12 12 12 [Divide in equal parts]
10 12 14
$10\times12\times14 = 1680$

91.

Let No $= x$
$x\times x + x - x = x^2$
by option $= 484 = (22)^2$

92.

7864K3
786
−403
383
$\frac{383-10k}{7}$
= by option $k = 4$

93.

7x1yyx
$\frac{8+2(x+y)}{3}$
$x+y = 2, 5, 7\cdots$
$= \frac{(7+1+y)-(x+y+x)}{11}$
$= \frac{8-2x}{11}$
$= x = 4$
$x+y = 5$
$x = 4$
$y = 1$

94.

$A-1 = B+1$
$A-B = 2$
$2(B-1) = A+1$
$2B-A = 3$
$A = 7, B = 5$
$A+B = 12$

95.

Divided $= Q\times d + R$
$10x = 25\times4y + 0$
$\frac{x}{y} = \frac{10}{1}$
$11x = Q\times5y + 0$
$Q = \frac{110}{5} = 22$

96.

$(a+b)^2 = 784$
$(a-b)^2 = (a+b)^2 - 4ab$
$= 784 - 768$
$(a-b)^2 = 16$
$(a-b) = 4$
$(a+b) = 28$
$a^2-b^2 = 4\times28$
$= 112$

97.

$\frac{\pi r\theta}{180} = 3r$
$\pi\theta = 180\times3$
or $\Delta OAB = \frac{\pi r^2\theta}{360}$
$= \frac{180\times3\times r^2}{360}$
$= 1.5r^2$

98.

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$\frac{8+6}{7} \Rightarrow \frac{(-1)+6}{7}$
$\Rightarrow \frac{1+6}{7} \Rightarrow 0$

99.

a b b a
3 2 — (i)
5 2 — (ii)
7 2, 6 — (iii) (iv)
8 4 — (v)
9 2, 6 — (vi), (vii)
6 4 — (viii)
7 6 7 0 1 = 8

100.

$a^3-b^3 = 6272$
$a-b = 8$
$(a-b)^3 = a^3-b^3-3ab(a-b)$
$512 = 6272 - 24ab$
$ab = 240$
12 20
8
$(20)^3 + (12)^3 = 9728$

101.

2m+1 is always odd
$a+a^2+\cdots a^{2m+1}$
$\frac{a(1+a+\cdots)}{6}$
$= 3.$

102.

$(x+y)^3 = x^3+y^3+3xy(x+y)$
$34^3 - 3xy(34) = 10234$
$xy = 285$
$x-y = \sqrt{(x+y)^2-4xy}$
$= \sqrt{34^2-4\times285}$
$= 4$
$x = 19, y = 15$
$19^3 - 15^3 = 3484.$

103.

N = 4a669c
19 − (a+b+c), ll Divisible
$a+b+c = 8, 19$
19 + (a+b+c), Divisible by 9
$a+b+c = 8, 17\cdots$
$a+b+c = 8$
Sum = 19+8 = 27

104.

$\frac{8-p}{6-p} = \frac{2-p}{9-p}$
$72-8p-9p+p^2 = 12-2p-6p+p^2$
$9p = 60$
$p = \frac{20}{3}$
mean $= \sqrt{(3\times\frac{20}{3}-6)(9\times\frac{20}{3}-4)}$
$= \sqrt{14\times56}$
$= 14\times2 = 28$

105.

$D = 5R$
$D = 5\times46 = 230$
$D = 10Q$
$Q = \frac{230}{10} = 23$
Dividend $= 230\times23+46$
$= 5336$

106.

294) 999999 (3401
882
1179
1176
399
294
105
$294-105 =$
$= 189.$

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107.

$\frac{8^8}{4} = \frac{(8^2)^4}{4} = \frac{2^4}{4} = \frac{16}{4}$

$= 2.$

108.

$2x+3y = 55$

$7x+2y = 65$

$x = 5, y = 15$

$= 20.$

109.

$\frac{11p924}{24}$ — 3x8

$\frac{924}{8}$ = 904, 944, 984

$q = 0, 4, 8$

$p+q = 3, 6, 9, 12, 15 \ldots$

$p = 7$

$q = 8$

$pq = 56$

110.

8) 2x4 (

$x = 0$ ✗

$x = 1$ ✗

$x = 2$ ✓

111.

$4^{12}(1+4+16+64)$

$4^{12} \times 85$

$4^{12} \times 17 \times 5$

$\neq 17$

112.

15x1y2

$y = 1$

15x112

$8-(2+x) = 0$

$x = 6$

$x+y = 7$

113.

$3 \times 5 \times 7 = 105$

105) 3499 (33

315

349

315

34

$99-34 = 65$

$p+q = 6+5$

$= 11$

114.

$\frac{N}{24}$ (9

$N = 24x + 24$

$2N = 2 \times 24x + 48$

$\frac{2 \times 24}{x} + \frac{48}{x}$

Rem = 48 - 19

= 35.

115.

$12 + C - (8+k) = 0$

$k = 5$

$12 + C - 8 - 5 = 0$

$C = 1$

$k + C = 6$

116.

2	53	1
3	26	2
5	8	3
	1	

$\frac{53}{18} = 1$

117.

$k^{22} - k = k^3 - k$

$k = 7 = 343 - 7 = 336$

24×14

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118.

$14400 = 2^6 \times 3^2 \times 5^2$

$3^2 \times 2^1 \times 5^0$

$3^2 \times 2^1 \times 5^1$] 3.

$3^2 \times 2^1 \times 5^2$

119.

No = ab

$6a - ab = 45$

$10b + a - 10a - b = 45$

$b - a = 5$

$b + a = 9$

$b = 7, a = 2$

No = 27.

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120.

If a number is divisible by 11x9 is always divisible by 9.

121.

$12 < x < 24$

13 23

11

122.

$x-4+x-2+x+x+2+x+4 = 2720$

$x = 544$

$2x+4 = 1092$

123.

$N_1 = pq+6$

$N_2 = p8+7$

Sum = $\frac{p(q+8)+13}{p}$

$13 < \boxed{5}$

124.

3	365	2
5	121	1
7	24	3
	3	

$= 365$

125.

$a^n b^n$ n=even

$(a+b)(a+b)$

$(8-1)(8+1) = 63$

126.

$\sqrt{\frac{25}{5} \times 245} = \sqrt{36 \times 49}$

$= 6 \times 7 = 42$

$\frac{42}{2} = 21$ evenprime

127.

5x79856y6

$y = 9$

$x = 8$ $\sqrt{2x8+9}$

$= -5$

128.

$\frac{x}{5} + 5 = \frac{x}{3} - 7$

$x = 90$

$\frac{x}{2} = 45$

129. The END.

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PERCENTAGE

CGL PRE 2018

Q.1 If the decreasing 120 by x% gives the same result as increasing 40 by x% then x% of 210 is what percent less than (x + 20)% of 180?
(a)$16\frac{2}{3}$ (b)18 (c)20 (d)$33\frac{1}{3}$

Q.2 When the price of an item was reduced by 20%, then the sale increased by x%. If there is an increase of 60% in receipt of the revenue, then the value of x is:
(a)100 (b)96 (c)80 (d)120

CHSL 2018

Q.3 The price of an article increase by 20% every year. If the difference between the prices at the end of the third and fourth years is Rs. 259.20, then 40% of the price (in Rs.) at the end of the second year is:
(a)384 (b)432 (c)472 (d)484

Q.4 Sudha decided to donate 12% of her monthly income to an orphanage. On the day of donation, she changed her decision and donated a sum of Rs. 4800 which was equal to 80% of what she had decide earlier. What is 27% of her monthly income?
(a)Rs. 14040 (b)Rs. 11934 (c)Rs. 13500 (d)Rs. 13959

CPO 2018

Q.5 The population of a town has increased by 5% at the end of the first year and decreased by 4% at the end of second year. If the population at the end of second year was 55,12,248, then the population at the beginning of first year was:
(a)54,68,500 (b)56,23,012 (c)53,00,420 (d)55,72,950

Q.6 In an examination, Shreya scored 84 out of 90 in Mathematics, 45 out of 50 in science, 23 out of 25 in Computer Science and 68 out of 80 in English. In which subject did Shreya score the highest percentage?
(a)Science (b)English
(c)Computer science (d)Mathematics

CGL MAINS 2018

Q.7 If the price of petrol increase by 19% and Sunita intends to spend only an additional 12% on petrol, by what percent should she reduce the quantity of petrol purchased (nearest to an integer)?
(a)5 (b)6 (c)8 (d)7

CGL PRE 2018

Q.8 Aman's annual income has increased by RS. 20 Lakhs but tax on income that he has to pay has reduced from 20% to 16%. He now pays the same amount of tax as earlier. What is his new total income (in Rs lakhs)?
(a)80 (b)120 (c)60 (d)100

Q.9 With reference to a number greater than one, the difference between itself and its reciprocal is 25% of the sum of itself and its reciprocal. By how much percentage (correct one decimal place) is the fourth power of the number greater than its square?
(a)64.5 (b)62.5 (c)66.7 (d)57.8

CPO 2019

Q.10 If 60% of (x-y) = 45% of (x+y) and y= k% of x, then 21% of k is equal to:
(a)3 (b)6 (c)1 (d)7

Q.11 When the price of sugar increased by 28%, a family reduced the consumption per month such that the expenditure on sugar was only 12% more than the earlier one. If the family consumed 18.4kg sugar per month earlier, what is its new consumption of sugar per month?
(a)15.75 kg (b)16.1 kg (c)15.8 kg (d)16.6 kg

Q.12 If A is 48% more than B and C is 60% less than the sum of A and B, then A is what percentage more than C?
(a)50.2 (b)49.2 (c)49.8 (d)50.8

CGL MAINS 2019

Q.13 Anuja owns $66\frac{2}{3}\%$ of a property. If 30% of the property that she owns is worth Rs.1,25,000 then 45% of the value (in Rs.) of the property is:
(a)2,81,250 (b)2,62,500 (c)2,25,000 (d)2,70,000

CPO 2020

Q.14 If decreasing 110 by x% gives the same result as increasing 50 by x%, then x% of 650 is what percentage more than (x+20)% of 180?
(a)136% (b)90% (c)154% (d)80%

Q.15 The monthly salary of a person was Rs. 50,000. He used to spend n family expenses(E), Taxes(T), charity(C), and the rest were his savings, E was 60% on the income, T was 20% of E, and C was 15% of T. When his salary got raised by 40%, he maintained the percentage level of E, but T becomes 30% of E, and C becomes 20% of T. The difference between two savings (in Rs) is:

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(a)250 (b)130 (c)220 (d)128

Q.16 The price of sugar is increased by 17%. A person wants to increase his expenditure by 7% only. By what percentage is correct to one decimal place. Should he reduce his consumption?
(a)8.5% (b)8.3% (c)8.7% (d)8.1%

Q.17 Salary of A increased by 8% in the year 2015 as compared to 2014 and decreased by 6% in the year 2016 as compared to 2015. If his salary was Rs. 2,34,778 in 2016, his salary (round off to nearest whole number) in 2014 was:
(a)Rs. 2,34,987 (b)Rs. 2,38,347
(c)Rs. 2,36,402 (d)Rs. 2,31,263

CGL PRE 2020

Q.18 The income of A is 45% more than the income of B and the income of C is 60% less than sum of the incomes of A and B. The income of D is 20% more than of C. If the difference between the incomes of B and D is Rs. 13,200, then the income (in Rs.) of C is:
(a)73500 (b)72500 (c)75000 (d)72000

Q.19 Rajan spent 10% of his salary on rent. He spent 20% of the remaining part of the salary on transport. After which he spent 40% of the balance of the salary on food. Further, he spent 80% of the balance on various bills. He deposits Rs. 5000 in the bank and kept the remaining Rs. 1480 for his own petty expenditure. Find his monthly salary (in Rs.).
(a)82500 (b)80000 (c)64800 (d)75000

Q.20 The present population of a village is 15280. If the number of males increases by 25% and the number of females increases by 15%, then the population will become 18428. The difference between present population of males and females in the village is:
(a)1840 (b)1380 (c)920 (d)2760

Q.21 Radha saves x% of her income. If her income increased by 28% and the expenditure increased by 20%, then her savings increased by 40%. What is the value of x?
(a)35 (b)40 (c)50 (d)25

CHSL 2020

Q.22 Ramesh saves $26\frac{2}{3}\%$ of his monthly salary. When his expenses are increased by 20%, he is able to save Rs. 4,080 per month. His monthly salary is:
(a)Rs.35,000 (b)RS.38,000
(c)Rs.34,000 (d)Rs.30,000

Q.23 When the price of an item was reduced by 20%, its sales increased by x%. If there is an increase of 25% in the receipt of the revenue, then the value of x is:
(a)53.84% (b)55.75% (c)56.25% (d)61.5%

Q.24 A, B and C are three positive numbers such that the average of three-fifth of A and 30% of B is 13.5, and the average of $\frac{3}{8}$ times of B and 25% of C is 15. If A is equal to $\frac{5}{12}$ times of C, then the sum of all three numbers A, B, and C is:
(a)125 (b)135 (c)145 (d)120

Q.25 Raghav spends 80% of his income. If his income increases by 12% and his expenditure increases by 17.5%, then what is the percentage decrease in his saving?
(a)12% (b)10% (c)8% (d)15%

Q.26 In an examination of 180 marks of subject, 75% marks are allocated for theory and the rest for project work. Veena scored 60% in theory. What percentage of marks must be she score in the project to achieve an overall 62% marks in the subject?
(a)65 (b)66 (c)68 (d)64

Q.27 A number is mistakenly multiplied by $\frac{7}{5}$ instead of being multiplied by $\frac{3}{2}$. What is the percentage change in the result due to this mistake?
(a)$6\frac{2}{3}\%$ (b)$7\frac{2}{3}\%$ (c)$3\frac{2}{3}\%$ (d)$5\frac{2}{3}\%$

Q.28 35% of the students in a college are girls and the rest are boys. The total number of students in the college is 2800. 75% of the boys and 85% of the girls passed the final examination. The percentage of total students who passed the final examination is:
(a)78% (b)82% (c)78.55 (d)80%

Q.29 A man sells two articles for Rs. 620 each, one at a profit of 24% and the other at a loss of 24%. What is his loss/profit percent the whole transaction?
(a)loss,12 (b)profit,12
(c)loss,5.76% (d) profit, 5.76

Q.30 If decreasing 180 by x% gives the same result as increasing 60 by x%, then x% of 410 will be more than (x+20)% of 210 (correct to two decimal places) by:
(a)36.57% (b)37.57% (c)31.67% (d)39.46%

Q.31 The price of an article increases by 5% every year. If the difference between its price at the end of the second and the third year is Rs. 52.50, then what will be its price at the end of the first year?
(a)Rs.1,000 (b)Rs.950 (c)Rs.840 (d)Rs. 900

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Q.32 Savita spends 20% of her monthly income on groceries. 15% of the remaining on rent and then 60% of the left over on children's education and others. If she saves Rs. 9,792 a month, then how much (in Rs.) does she spend on rent?
(a)3,960 (b)4,450 (c)4,200 (d)4,320

SSC SELECTION PHASE IX

Q33. A number is decreased by 35%, then increased by 25% and then further increased by 15%. What is the net increase/decrease percentage in the number (correct to the nearest integer)?
(a) 6% increase (b) 15% decrease
(c) 14% increase (d) 7% decrease

SSC CGl PRE 21

Q34. A fruit seller sells 45% of the oranges that he has along with one more orange to a customer. He then sells 20% of the remaining oranges and 2 more oranges to a second customer. He then sells 90% of the now remaining oranges to a third customer and is still left with 5 oranges. How many oranges did the fruit seller have initially?
a) 111 b) 120 c) 100 d) 121

Q35. A reduction of 20% in the price of banacas enables a customer to buy 6 more bananas for Rs80. What is the reduced price of bananas per dozen (in Rs)?
a) 36 b) 32 c) 40 d) 35

Q36. Ankita's weight is 20% less than that of her grandmother. The grandmother weighs 26 kg less than grandmother's husband, whose weight is 81 kg. If Ankita's brother is 8 kg heavier than Ankita, then what is the weight (in kg) of Ankita's brother?
a) 36 b) 52 c) 60 d) 19

Q37. A reduction of 15% in the price of wheat enables a housewife to buy 6 kg more for Rs2,720. The reduced price of wheat per kg (in Rs) is:
a) 68 b) 65 c) 75 d) 70

MTS 2020

Q38. Kamal saves X% of her monthly income. When her monthly expenditure by 20% and the monthly income increases by 26%, then her monthly savings increase by 60%. What is the value of X?
(a) 16 (b) 18 (c) 15 (d) 19

Q39. A is 120% of B and B is 65% of C. If the sum of A,B and C is $121\frac{1}{2}$, then the value of 2C-4B+A is:
(a) 12 (b) 15 (c) 9 (d) 10

Q40. A man ordered 10 physics books and some chemistry books. The price of a chemistry book is twice the price of a Physics book. While preparing the bill, the clerk interchanged the number of physics and chemistry books by mistake. Which decreased the bill by 12.5% . the ratio of the number of physics books to the number of chemistry books in the original order is:
(a) 3:4 (b) 3:5 (c) 4:5 (d) 2:3

Q41. $\frac{11}{5}$ of a number A is 22% of a number B. the number B is equal to 2.5% of a third number, C. if the value of number C is 5500, then the sum of 40% of A and 20% of B is:
(a) 36 (b) 30 (c) 33 (d) 32

Q42. Varun gave 60% of the money he had to his wife. He also gave 20% of the remaining amount to each of his three children. Three-fifth of the amount now left was spent on miscellaneous items, and the remaining amount of Rs 9,600 was deposited in the bank. How much money did Varun have initially?
(a) Rs 1,80,000 (b) Rs 2,00,000
(c) Rs 1,50,000 (d) Rs 6,00,000

Q43. Surekha spends 24% of her monthly income on groceries, 16% of it on rent and 55% of the remaining on children's education and others. If she saves Rs 5,940 in a month, then how much (in Rs) does she spend on rent?
(a) 3,960 (b) 3,740 (c) 3,300 (d) 3,520

SSC CGL MAINS 2020

Q44. The monthly expenses of a person are $66\frac{2}{3}\%$ more than her monthly savings. If her monthly income increases by 44% and her monthly expenses increase by 60%, then there is an increase of Rs 1,040 in her monthly savings. What is the initial expenditure (in Rs)?
(a) 12,000 (b) 13,000 (c) 9,000 (d) 10,000

Q45. A save 35% of his income, if his income increase by 20.1% and his expenditure increases by 20%, then by what percentage do his savings increase or decrease? (correct to one decimal place)
(a) 21.9% of increase (b) 20.3% of increase
(c) 18.5% of decrease (d) 19.75% of decrease

Q46. The monthly salary of a person was Rs.1,60,000. He used to spend on three leads – Personal and family expenses (P), Taxes (T) and Education loan (E). The rest were his savings. P was 50% of the income, E was 20% of P, and T was 15% of E. When his salary got raised by 30%, he maintained the percentage level of P, but E became 30% of P and T became 20% of E. The sum of the two savings (in Rs.) is:
(a) 2,11,680 (b) 1,28,160 (c) 1,18,620 (d) 1,62,810

DP 2022

Q47. If the price of rice is raised by 28%, then by how much per cent should a person reduce his consumption of rice, so that his expenditure remains the same?
a) 22.875% b) 21.875% c) 24.875% d) 23.875%

CPO 2022

Q48. In an election between 2 parties A and B, A gets 37% of total votes cast and thus lost by 338 votes. The total number of casted votes is (assume none of the votes was declared invalid):

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a) 1300 b) 1500 c) 1200 d) 1800

Q49. In an election, a candidate secures 42% of the votes polled but is defeated by his only opponent by a majority of 3080 votes, because of 1400 invalid votes. The percentage of invalid votes is _____ .
a) 5% b) 3% c) 4% d) 6%

Q50. In an election between two candidates, 65% of the voters cast their votes, out of which 3% of the votes were decided to be invalid. A candidate got 81965 votes which are 65% of the total valid votes. What is the total number of votes enrolled in that election?
a) 200000 b) 190000 c) 215000 d) 185000

CGL PRE 2022

Q51. During the first year, the strength of a school increased by 12%, in the second year it decreased by 12% and in the third year it increased by 10%. At the end of the third year its strength was nearly 10842. What was the strength at the beginning of the first year?
a) 8000 b) 10000 c) 6500 d) 12000

Q52. Raju, Ravi and Ashok contested an election. 5% votes polled were invalid. Raju got 30% of the total votes. Ravi got 32% of the total votes. The winner got 5136 more votes than the person who received the least number of votes. Find the total number of votes polled.
a) 171200 b) 64200 c) 171220 d) 172100

Q53. In the election, 8% of the voters did not cast their votes. Two candidates contested the election in which the winning candidate got 48% of the total votes and won election by 1100 votes. Find the total number of voters in the election, given that all the votes cast were valid?
a) 25500 b) 26500 c) 27500 d) 28500

Q54. In an election between two candidates, the defeated candidate secured 42% of the valid votes polled and lost the election by 7,68,400 votes. If 82,560 votes were declared invalid and 20% people did NOT cast their vote, then the invalid votes were what percentage (rounded off to 1 decimal place) of the votes which people did NOT cast?
a) 10.6% b) 9.8% c) 12.9% d) 6.8 %

Q55. In an election between two candidates, 12% of voters did not cast their votes. The winner by obtaining 68% of the total votes defeated his contestant by 2880 votes. What was the total number of voters who cast their votes in the election?
a) 5280 b) 8000 c) 4000 d) 6000

Q56. A mask manufacturing company manufactured 'X' number of masks in 2018. It increased its manufacturing capacity by 30% in 2019 and then increased its manufacturing by 15% in 2020. In 2021, its manufacturing declined by 40% due to wear and tear of machinery. What will be the value of 'X' if 179400 masks are manufactured in 2021?
a) 180000 b) 230000 c) 210000 d) 200000

Q57. A faulty weighing machine reads 1 kg when 900 gm is actually weighted on it. The shopkeeper marked the price of his goods by 10%, but unfortunately he was caught by the metrology department and then they ordered him to repair his weighing machine and gave punishment to sell the goods at 10% discount on cost price for a month. If each customer is now paying Rs20 for 1 kg, then before the raid ___ amount they have paid for the same quantity. (Rounded off to two places of decimal)
a) Rs27.16 b) Rs27.04 c) Rs28.05 d) Rs28.15

CGL MAINS 2022

Q58. Rewa has some hens and some goats. If the total number of animal heads is 100 and the total number of animal feet is 348, then what is the total number of goats with Rewa?
a) 76 b) 74 c) 55 d) 80

CHSL PRE 22

Q59. If 20 percent of P is added to 40 percent of Q, then the resultant comes as 80 percent of Q. P is what percentage of Q?
a) 200 % b) 225 % c) 150% d) 125 %

Q60. Weight of Ayush and Abhishek are in the ratio of 8 : 5. Abhishek's weight increases by 40 percent and total weight of Ayush and Abhishek both increases by 60 percent. If total weight becomes 104 kg, then what is the weight of Ayush after the increment?
a) 75 kg b) 60 kg c) 72 kg d) 69 kg

Q61. If price of an apple is reduced by 30 percent, it enables the customers to buy 5 more apples for Rs 140. Find the reduced rate of apple.
a) Rs 12 b) Rs 8.4 c) Rs 14 d) Rs 7

Q62. P's income is 150 percent of Q's income and P's expenditure is 60 percent of Q's expenditure. If Q saves 20 percent of his income, then how much percentage does P save of his own income ?
a) 72 percent b) 75 percent c) 60 percent d) 68 percent

Q63. If price of rice is increased by 25 percent, then by what percentage consumption of rice should be decreased so expenditure incurred on rice gets decreased by 40 percent ?
a) 52 percent b) 43.33 percent c) 42 percent d) 48 percent

ICAR & SELECTION PHASE XI

Q64. Two saleswomen, Kavitha and Kalyani, are allowed 12% and 15% commission, respectively on the total sales made by them. Kavitha gets 3% and Kalyani gets 5% extra bonus on the sales over Rs 20,000. If the difference in total earning of both Kavitha and Kalyani is Rs 7,600, then Kavitha's total earning is:
1. Rs 19,200 2. Rs 21,600 3. Rs 17,800 4. Rs 23,400

Q65. Three-seventh of voters promise to vote for A and the rest promise to vote for B. Of these, on the last day 12% of the voters went back on their promise to vote for A and 20% of voters went back on their promise to vote for B and A lost by 234 votes. The total number of voters was:
1. 13,650 2. 14,555 3. 15,550 4. 12,525

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Q66. In an election between two candidates, one candidate got 60% of the valid votes. If the total number of votes polled were 8850, and 10% of the votes were invalid, then find the number of valid votes that the other candidate got.
1. 3816 2. 3618 3. 3186 4. 3681

Q67. Total savings of X and Y is 40% of their total income. Their average expenditure is Rs 21,000. What is the total salary of X and Y?
1. Rs 60,000 2. Rs 70,000 3. Rs 65,000 4. Rs 55,000

Q68. When income tax is 8 paisa in a rupee, a person's net income is Rs 3,09,580. What will be his net income (in Rs) if the income tax is raised to 12 paisa?
1. 2,96,120 2. 3,05,460 3. 2,97,820 4. 2,98,950

Q69. In an election between two candidates, one got 54% of the total valid votes; 8% of the votes were invalid. If the total number of votes was 7500, then the winning candidate won by how many votes?
1. 566 2. 552 3. 574 4. 580

Q70. Ram sold two bags at Rs 1260 each. On one, he gained 20% and on the other, he lost 20%. Find his gain or loss percentage in the whole transaction.
1. Loss 4% 2. Loss 5% 3. Gain 5% 4. Gain 4%

Q71. The monthly income of a person was Rs 80,000 and his monthly expenditure was Rs 45,000. Next year, his income increased by 16% and his expenditure increased by 8%. Find the percentage increase in his savings (correct to 2 decimal places).
1. 25.35% 2. 44.36% 3. 30.25% 4. 26.29%

Q72. In an election between two candidates, 80% of the voters cast their votes, out of which 10% of the votes were declared invalid. A candidate got 9,936 votes which were 60% of the total valid votes. Find the total number of voters enrolled in that election.
1. 24000 2. 23000 3. 25500 4. 24320

Q73. A reduction of 15% in the price of washing powder enables a purchaser to obtain 5 kg more for Rs 1275. The original price of the washing powder per kg is:
1. Rs 40 2. Rs 50 3. Rs 45 4. Rs 55

Q74. In an election, 15% of the voters on the voters list did not cast their votes and 100 voters cast their ballot paper blank. There were only two candidate Ram and Shyam. The winner, Ram, was supported by 69% of all the voters in the list and he got 630 votes more than Shyam. Find the number of voters on the list.
1. 1000 2. 1200 3. 1300 4. 1100

Q75. The ratio of the number of boys to that of girls in a village is 5 : 3. If 40% of the boys and 60% of the girls appeared in an examination, then the ratio of the number of boys and girls who appeared in the examination to the number who did not appear in the same examination, is:
1. 17 : 21 2. 17 : 27
3. 19 : 23 4. 19 : 21

CGL PRE 23

Q76. In an election, 2% persons enrolled in the voter list did not participate and 500 votes were invalid. Two candidates A and B fought the election, and A defeated B by 200 votes. If 43% of the persons enrolled in the voter list casted their votes in favour of A, then what is the number of the total casted votes?
1) 2450 2) 2800 3) 3000 4) 3250

Q77. The ratio between monthly income and expenditure of Vaidik is 8 : 5. If his income increases by 20% and his expenditure increases by 30%, then find the percentage increase or decrease in his monthly savings.
1. $3\frac{1}{3}\%$ increase 2. $5\frac{2}{3}\%$ increase
3. $3\frac{1}{3}\%$ decrease 4. $5\frac{2}{3}\%$ decrease

Q78. If x% of 280 = 15% of 240 + 20% of 310, then the value of x is _____.
1. 35 2. 38 3. 30 4. 40

Q79. Suhani pays tax at the rate of 30% on her entire income of ₹ 90,000 and Ritika pays tax at the rate of 40% on her entire income of ₹ y. If the total rate of tax on their combined income becomes 37%, then what is the value of y?
1. Rs 2,16,000 2. Rs 2,13,000 3. Rs 2,04,000 4. Rs 2,10,000

Q80. The price of an article is increased by r%. The new price was decreased by r% later. Now the latest price is Rs 1. What was the original price of the article?
1. $\frac{10000}{10000-r^2}$ 2. $\frac{10000-r^2}{10000}$ 3. $\frac{100}{100-r^2}$ 4. $\frac{100}{1-r^2}$

Q81. In January 2022, Kriti paid an EMI, which was 22% of her monthly salary. She spent the remaining salary on shopping of groceries and clothes in the ratio 7 : 5. She spent Rs 18,200 on shopping of clothes. If, in February 2022, her salary increased by 16%, then what was her salary (in Rs) in February?
1. 64,960 2. 68,520 3. 66,350 4. 70,250

Q82. In an examination a candidate had to sit for three papers A, B and C. The candidate secured 75% marks in Paper A, 80% marks in Paper B, and 60% marks in Paper C. If the weightage assigned to Papers A, B and C were 40%, 50% and 10%, respectively, then find the weighted percentage of marks obtained by the candidate, when all three papers were taken together.
1. 77% 2. 74% 3. 72% 4. 76%

Q83. A dishonest shopkeeper sells mangoes at Rs 30/kg bought at Rs 20/kg and he is giving 800 g instead of 1 kg. The shopkeeper's actual profit percentage is :
1. 75% 2. 37.5% 3. 50% 4. 87.5%

CHSL PRE 23

Q84. Ravi initially had a certain number of chocolates. While Bhanu initially had 80% of the number of chocolates that Ravi initially had, Ravi gave 10% of his chocolates to his sister while Bhanu received from his uncle another 35% of the number of chocolates he initially had. If Bhanu finally had 54 chocolates, how many chocolates did Ravi give to his sister?

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1. 4 2. 6 3. 5 4. 3

Q85. Aastha spends 15% of her total income on travelling and 20% of the rest income on food and then donates Rs 380 and after that, she saves Rs 2000. Find her total income (in Rs).
1. 3650 2. 3500 3. 3600 4. 3800

Q86. Two years ago, the population of the city was 5,00,000. If the annual birth rate and the annual death rate are 6% and 3%, respectively, what is the present population of the city ?
1. 536440 2. 580440 3. 530450 4. 540550

Q87. Two candidates A and B contested in an election. 80% of the voters cast their votes, out of which 2% of the votes were invalid. A got 9,408 votes which was 60% of the valid votes. Find the total number of votes.
1. 22,000 2. 21,000 3. 20,000 4. 12,000

Q88. A man spent 30% of his monthly income on rent. He spent 15% of the remaining amount on food. 35% of the amount now left was used for all other expenses. If Rs 1,62,435 was left with him, then his monthly income was:
1. Rs 5,40,000 2. Rs 4,80,000
3. Rs 4,20,000 4. Rs 3,60,000

Q89. In a village election between three candidates, 80% of the voters cast their votes, out of which 3% votes were declared invalid. The winning candidate got 42,680 votes which were 55% of the total valid votes. Find the number of valid votes received by the candidate who stood third, given that he received only 10% of the total valid votes.
1. 7700 2. 7760 3. 7670 4. 7680

Q90. Rumi used to save 20% of her income. If her income went up by 30%, while her expenditure went up by 40%, her nominal savings went down by Rs 750. Find Rumi's initial income (in Rs).
1. 38,500 2. 36,000 3. 37,500 4. 35,000

Q91. A spends 68% of his monthly income. If A's monthly income increases by 25% and his monthly saving increase by 15%, then the percentage increase in his monthly expenditure will be:
1. $31\frac{6}{17}\%$ 2. $33\frac{7}{17}\%$ 3. $29\frac{12}{17}\%$ 4. $27\frac{13}{17}\%$

CGL MAINS 23

Q92. Hari, Kamal and Lalit contested an election in which 6050 votes were polled and none of the votes were invalid. Kamal got 42% more votes than the total votes obtained by Hari and Lalit together. If Lalit obtained only 8% of the total polled votes, find the number of votes obtained by Hari.
(a) 1556 (b) 2016 (c) 1668 (d) 1912

SELECTION PHASE XII

Q93. The sum of the two numbers is 450. If the greater number is decreased by 4% and the smaller number is increased by 20%, then the numbers obtained are equal. The smaller number is:
a) 144 b) 164 c) 200 d) 176

Q94. Sandeep spends 32% of his annual income on food, 20% of the remaining income on travelling, and 35% of the remaining income on clothes, and still saves ₹70,720 per year. What is the annual income (in ₹) of Sandeep?
a) 2,00,000 b) 4,50,000 c) 3,75,000 d) 5,44,000

Q95. In a Panchayat election, three contestants - A, B, and C, are contesting. 75% of the total population of 8000 cast their votes. There were no invalid or NOTA votes in the election. A got the least votes, with only 300 votes. B got 66% of the total votes and won the election. How many votes did B get?
a) 3960 b) 5280 c) 3660 d) 4060

Q96. Akshara scores 85% in five subjects together. The subjects are Hindi, Science, Mathematics, English and Computers, where the maximum marks of each subject are 100. Akshara scores 75 marks in Hindi, 92 marks in Computers, 89 marks in Mathematics, and 81 marks in English. How many marks did Akshara score in Science?
a) 92 b) 73 c) 67 d) 88

Q97. In an election between two candidates, 75% of the voters cast their votes, out of which 2% of the votes were declared invalid. A candidate got 9,261 votes, which were 75% of the total valid votes. Find the total number of votes.
a) 17,200 b) 16,800 c) 17,000 d) 17,400

Q98. The rice sold by a grocer contained 20% of low-quality rice. What quantity of good-quality rice should be added to 175 kg of mixed rice so that the percentage of low-quality rice remains 10%?
a) 150 kg b) 100 kg c) 175 kg d) 125 kg

Q99. In an election between two candidates, 75% of the voters cast their votes, out of which 2% of the votes were declared invalid. A candidate got 9,261 votes, which were 75% of the total valid votes. Find the total number of votes.
a) 17,200 b) 16,800 c) 17,000 d) 17,400

Q100. The sum of the two numbers is 450. If the greater number is decreased by 4% and the smaller number is increased by 20%, then the numbers obtained are equal. The smaller number is:
a) 144 b) 164 c) 200 d) 176

Q101. In an examination, there were two papers, A and B, and the maximum mark in each of the two papers was 10. However, the weights assigned to papers A and B were in the ratio 2 : 1, respectively. Jonathan scored 8 out of 10 in Paper A and an overall 70% in the examination. How much did he score in Paper B out of 10?
a) 6.5 b) 6 c) 5 d) 5.5

Q102. In an examination, there were two papers, A and B, and the maximum mark in each of the two papers was 10. However, the weights assigned to papers A and B were in the ratio 2 : 1, respectively. Riddhi scored 8 out of 10 in Paper B,

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and an overall 70% in the examination. How much did she score in Paper A out of 10?

a) 5 b) 5.5 c) 6 d) 6.5

Q103. In an election between two candidates, 10% of the voters did not cast their vote and 5% of the votes polled were found invalid. The successful candidate got 55% of the valid votes and won by a majority of 1,710 votes. The number of voters enrolled on the voters list was:

a) 21,000 b) 18,000 c) 19,000 d) 20,000

Q104. In an examination, there were two papers, A and B, and the maximum mark in each of the two papers was 10. However, the weights assigned to papers A and B were in the ratio 2 : 1, respectively. Riddhi scored 8 out of 10 in Paper B, and an overall 70% in the examination. How much did she score in Paper A out of 10?

a) 5 b) 5.5 c) 6 d) 6.5

Q105. The strength of a school increases and decreases every alternate year by 20%. It started with an increase in 2018. What is the strength of the school at the start of 2021 as compared to that of 2018?

a) Decrease by 16.2% b) Increase by 15.2%
c) Decrease by 15.2% d) Increase by 16.2%

CPO 2024

Q106. 57% of Ranita's weekly income is equal to 76% of Bhaskar's weekly income. If Ranita's weekly income was reduced by ₹400, while Bhaskar's weekly income did not change, the ratio of the weekly incomes of Ranita and Bhaskar, respectively, would have been 6 : 5. What is Bhaskar's weekly income (in ₹)?

a) 2800 b) 4000 c) 3000 d) 3200

Q107. In an election, 12% of the voters in the voter list did not cast their votes, whereas 84 voters cast their ballot papers blank. There were only two candidates: Ramagya and Shravan. The winner, Ramagya, was supported by 54% of all the voters in the list. He got 1456 more votes than his rival, Shravan. Find the total number of voters in the list.

a) 5690 b) 6670 c) 7860 d) 6860

Q108. In an election between two candidates, the candidate who gets 35% of the votes polled is defeated by 15,900 votes. What is the total number of votes polled?

a) 53,000 b) 45,000 c) 35,000 d) 43,000

Q109. Bhavani spends 68% of her income. Her income increases by 15% and her expenditure increases by 10%. How much is the increase in the percentage of saving? (Use decimal up to 2 digits)

a) 20.57% b) 25.62% c) 28.42% d) 24.80%

Q110. In an election between A and B, every fifth vote polled was marked as invalid by the machine. In the remaining votes, A wins the election with a margin of 2500 votes or 10% of the total votes polled, over B. If 90% of the invalid votes would have been in favour of B, then which of the following would have been the result of the election?

a) B would have won by 8% b) B would have won by 3%
c) A would have won by 3% d) A would have won by 8%

Q111. In an election between P, R and S,1/10 of the total votes polled are invalid. Votes polled in favour of R and S are half of the total votes polled, and they get equal votes. Due to a fault in the machine, half of the votes of S and half of the invalid votes are counted additionally in favour of R. What is the overall percentage of votes secured by R due to the fault?

a) 37.55% b) 41.55% c) 38.5% d) 42.5%

CHSL 2024

Q112. In an election, a voter has choices to vote for one candidate out of three candidates. There is also an option 'None Of The Above' (NOTA) to reject all candidates. The three candidates get votes that are 6 times NOTA. The winner gets votes that are twice the second runner-up's votes. The first runner-up gets 900 votes more than NOTA and defeats the second runner-up by 150 votes. What is the total number of votes polled?

a) 17715 b) 15177 c) 11025 d) 11577

Q113. In an election between two candidates, 30% voters did not cast their votes and 200 votes were declared invalid. The winner got 65% of the valid votes. If he won by 1200 votes, then find the total votes.

a) 9000 b) 8000 c) 7000 d) 8000

Q114. In an election between two candidates, the defeated candidate secured 42% of the valid votes polled and lost the election by 2545800 votes. If 365500 votes were declared invalid and 30% people did not cast their vote, what was the approximate number of people (in millions) in the electorate who did NOT cast their votes?

a) 5 b) 6 c) 8 d) 7

Q115. Last year, Geeta's monthly salary was Rs 12,000 and Seeta's monthly salary was Rs 10,000. This year, Geeta's monthly salary is Rs 14,400, while Seeta's monthly salary is Rs 12,500. If the percentage increase in Seeta's monthly salary this year over her monthly salary last year is denoted by x%, and the percentage increase in Geeta's monthly salary this year over her monthly salary last year is denoted by y%, then what is the value of $\left(\frac{x-y}{y} \times 100\right)\%$?

a) 24 b) 20 c) 22 d) 25

CGL 2024

Q116. The price of an item is increased twice successively. The final price is Rs 2295 and initial price was Rs 1000. The percentage increment the second time was twice the percentage increment the first time. By what percentage was the price increased the second time?

a) 35% b) 65% c) 70% d) 25%

Q117. In an election between two candidates P and Q, P got 78% of the total valid votes. If the votes of the electorate were

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75,60,000, then what was the number of valid votes that Q got if 10% of the voters did not cast their vote and 15% of the votes polled were declared invalid?

a) 1,47,312 b) 1,41,372
c) 12,72,348 d) 1,41,732

Q118. At a cafe, Rama bought drinks for her 7 friends at Rs 240. Some of them wanted coffee, while others wanted black tea. A regular cup of coffee cost Rs 40 and a regular cup of black tea cost Rs 30. How many cups of tea did she purchase?

a) 5 b) 4 c) 3 d) 6

Q119. A stock portfolio consists of four stocks. Stock a represents 20% of the portfolio and has a return of 6%. Stock B represents 30% of the portfolio and has a return of 8%. Stock C represents 20% of the portfolio and has a return of 4%. Stock D represents the remaining 30% of the portfolio and has a negative – return of 5%. What is the average return of the portfolio?

a) 2.9% b) 3.2% c) 2.6% d) 3.4%

Q120. R pays Rs 100 to P with Rs 5, Rs 2 and Rs 1 coins. The total number of coins used for paying are 40. What is the number of coins of denomination Rs 5 in the payment?

a) 13 b) 18 c) 17 d) 16

Q121. In an election between two candidates, y% of the voters did not vote. 10% of the votes cast were declared invalid, while all the valid votes were cast in favour of either of the two candidates. The candidate who got 59.375% of the valid votes cast was declared elected by 2484 votes. If the number of people eligible to vote in that election was 16,000, what is the value of y?

a) 7.5 b) 8.4 c) 7.2 d) 8

Q122. R targets to score 85% marks in exams. He scores 450 marks and misses the target by 35%. How much increment in percentage should be there in his scored marks to meet the target?

a) 70 b) 35 c) 53 d) 45

Q123. In a constituency, 45% of the total number of voters are males and the rest are females. If 60% of the males are illiterate and 60% of the females are literate, then by what per cent is the number of illiterate females more than that of literate males?

a) 19.11% b) 27.23% c) 30.24% d) 22.22%

Q124. Two successive percentage decrease of 25% each is by what percentage less than two successive percentage increase of 25% each?

a) 56.25% b) 22.22% c) 43.75% d) 50%

Q125. Every month, a man consumes 20 kg of rice and 8 kg of wheat. The price of rice is 20% of the price of wheat, resulting in a total expenditure of ₹300 per month for rice and wheat combined. If the price of wheat is increased by 20%, what percentage reduction in rice consumption is needed to maintain the same expenditure of ₹300?

a) 24% b) 40% c) 22% d) 38%

ANSWERS

1	A	2	A	3	B
4	C	5	A	6	D
7	B	8	D	9	C
10	A	11	B	12	B
13	A	14	A	15	C
16	A	17	D	18	A
19	D	20	A	21	B
22	C	23	C	24	A
25	B	26	C	27	A
28	C	29	C	30	D
31	A	32	D	33	D
34	B	35	B	36	B
37	A	38	C	39	C
40	D	41	C	42	C
43	D	44	D	45	B
46	B	47	B	48	A
49	A	50	A	51	B
52	A	53	C	54	D
55	A	56	D	57	A
58	B	59	A	60	D
61	B	62	D	63	A
64	D	65	A	66	C
67	B	68	A	69	B
70	A	71	D	72	B
73	C	74	A	75	D
76	A	77	A	78	A
79	D	80	A	81	A
82	D	83	D	84	C
85	B	86	C	87	C
88	C	89	B	90	C
91	C	92	B	93	C
94	A	95	A	96	D
97	B	98	C	99	B
100	C	101	A	102	D
103	D	104	D	105	B
106	C	107	D	108	A
109	B	110	A	111	D
112	C	113	B	114	D
115	D	116	C	117	C
118	B	119	A	120	A
121	D	122	A	123	D
124	B	125	B		

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1.

$\frac{120(100-x)}{100} = \frac{40(100+x)}{100}$

$300 - 3x = 100 + x$

$x = 50$

$210 \times 50\% : 180 \times 70\%$

$105 : 126$

$= \frac{21}{126} \times 100$

$= 16\frac{2}{3}$

2.

80 — 20% $= \frac{1}{2}$

160 — 60%

$= \frac{1}{1} \times 100$

$= 100\%$

3.

III IV

5 — 6

1

$1 = 259.2$

$\frac{259.2 \times 5 \times 5 \times 46}{10 \times 6 \times 100}$

$= 432$

4.

Income = 100

Donation = 12

later " $= 12 \times 80\%$

$= 9.6$

$\frac{9.6}{10} = 4800$

$97\% = 13500$

5.

20 : 21

25 : 24

500 504

$500 — 5512248$

$500 — \frac{5512248}{504} \times 500$

$= 5468500$

6.

highest % $= \frac{84}{90} \times 100 = 93.33\%$ maths

7.

25 : 29

50 : 57

10 : 7

12500 — 11571

-929

% change $= \frac{929}{12500} \times 100 = 7\%$

8.

$(x + 20L) \times \frac{16}{100} = \frac{x \times 20}{100}$

$4x + 80L = 5x$

$x = 80L$

New Income $= 80 + 20 = 100L$

9.

$\left(x + \frac{1}{3}\right)\frac{1}{4} = x - \frac{1}{x}$

$x + \frac{1}{x} = 4x - \frac{4}{x}$

$\frac{5}{x} = 3x$

$x^2 = \frac{5}{3}$

$x^4 = \frac{25}{9}$] 10/9

% $= \frac{\frac{10}{9}}{\frac{5}{3}} \times 100$

$= 66.7\%$

10.

$(x - y)\frac{60}{100} = (x + y)\frac{45}{100}$

$4x - 4y = 3x + 3y$

$x = 7y$

$\frac{x}{y} = \frac{7}{1}$

$y = \frac{x \times k}{100}$

$k = \frac{100}{7}$

$\frac{100}{7} \times \frac{21}{100} = 3$

11.

$\frac{128}{112} = \frac{8}{7}$

$8 — 18.4$

$7 — \frac{18.4}{8} \times 7 = 16.1$

12.

A B C

37 25 $62 \times \frac{2}{5}$

A C

185 124

$\frac{61}{124} \times 100 = 49.2$

13.

$66\frac{2}{3} = \frac{2}{3}$

$\frac{2}{3} \times \frac{36}{100} = 12500$

$1 — \frac{12500 \times 30 \times \frac{45}{100}}{6}$

$= 281250$

14.

$\frac{110(100-x)}{100} = \frac{50(100+x)}{100}$

$x = \frac{150}{4} = 37.5$

$\frac{650 \times 875}{1000} : \frac{180 \times 575}{1000}$

325 : 138

136%

15.

E	T	C	Saving
30000	6000	900	13100
+ 40%			220
42000	12600	2520	12880

$\Rightarrow 220$.

16.

$\frac{117}{104}$) +10 $\Rightarrow \frac{10}{117} \times 100 = 8.5\%$

17.

25 : 27

50 : 47

1250 1269

$\frac{2347}{1269} \times 1250 = 231263$

18.

A B C D

29 20 $\frac{49 \times 2}{5}$ $\frac{49 \times 2}{5} \times \frac{6}{5}$

20×25 $\frac{49 \times 2 \times 25}{5}$

$\frac{49 \times 2 \times 6 \times 25}{25}$

$(588 - 500)R = 13200$

$R = \frac{13200}{88}$

C's $= \frac{13200}{88} \times 490$

$= 73500$.

19.

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Income = 100R

$100 \times \frac{9}{10} \times \frac{4}{5} \times \frac{3}{5} \times \frac{1}{5} = 5000 + 1480$

$\frac{9 \times 48R}{50} = 6480$

$R = 750$

$100R = 75000$

20.

m	F
15+10	15

$\frac{15280 \times 115}{100} = 17572$

$18428 - 17572 = 856$

$10\%\ m = 856$

$100\%\ m = 8560$

$F = 15280 - 8560$

$= 6720$

Diff = 1840

21.

$S = \frac{2}{5} \times 100 = 40\%$

22.

$I = 300x$

$S = 300x \times 26\frac{2}{3} = 80x$

$E = 220x$

$+20\%$

$264x$

$264x = 4080$

$I = \frac{4080}{36} \times 300$

$= 34000$

23.

$\frac{80}{125} = \frac{16}{85} = \frac{900}{76}$

$\Rightarrow 56.05\%$

24.

$\frac{A}{C} = \frac{5}{12} = \frac{5R}{12R}$

$\frac{3A}{5} + \frac{3B}{10} = \frac{135 \times 2}{10}$

$\frac{6A + 3B}{10} = 135$

$6A + 3B = 270$ —(1)

$\frac{3B}{8} + \frac{C}{21} = 30$

$3B + 2C = 240$ —(2)

$6A - 2C = 30$

$R(6 \times 5 - 2 \times 12) = 30$

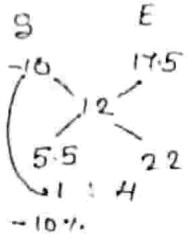
$R = 5$

$A = 25$

$C = 60$

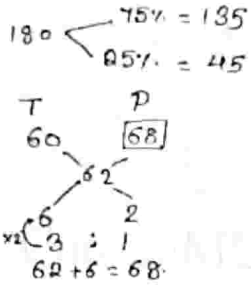
$B = \frac{410}{185}$

25.



-10%

26.



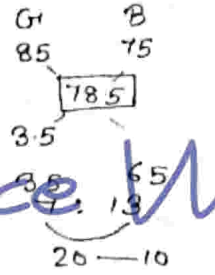
$62 + 6 = 68$

27.

$\frac{\frac{3}{2} - \frac{7}{5}}{\frac{3}{2}} = \frac{\frac{1}{10}}{\frac{3}{2}} = \frac{1 \times 100}{15}$

$= \frac{20}{8} = 6\frac{2}{3}\%$

28.



$= 3.5$

$75 + 3.5 = 78.5$

29.

$-\frac{24^2}{100} = -5.76$

30.

$\frac{180(100-x)}{100} = \frac{60(100+x)}{100}$

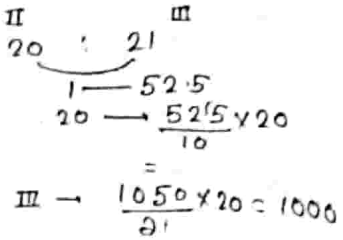
$x = 50$

$410 \times 50 = 205$

$210 \times 70\% = 147$) 58

$\frac{58}{147} \times 100 = 39.46\%$

31.



32.

$I = 100x$

$100x \times \frac{4}{5} \times \frac{17}{20} \times \frac{2}{5} = 9792$

$x = 360$

$100x = 36000$

Rent = $36000 \times \frac{4}{5} \times \frac{3}{20}$

$= 4320.$

33.

$-35 + 25 - \frac{35 \times 25}{100}$

$= -18.75$

$-18.75 + 15 - \frac{18.75 \times 15}{10000} = 2.8$

$-3.75 - 2.8 = -6.55\%$

$\simeq -7\%$

34.

Start with last term.

10% left — 5

100% — 50

80% - 2 = 50

80% = 52

100% — 65

55% - 1 = 65

55% = 66

100% = 120.

35.

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$20\% - \frac{1}{5}$

$\frac{4}{5}$) 1 — 6

$\frac{24}{30}$

$\frac{80}{20} \times 12 = 40.$

36.

A D H

44 65 81

B → 44+8 = 52.

37.

$15\% \cdot \frac{17}{20}$) 3 — 6kg

$\frac{34}{40}$ — old / New

old rate = $\frac{2720}{34} = 80$

New " = $\frac{2720}{40} = 68.$

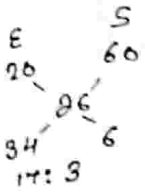
38.

E S

20 60

26

34 6



17 : 3

$S = \frac{3}{20} \times 100$

$= 15\%$

39.

$A = \frac{B \times 120}{100}$, $B = \frac{C \times 65}{100}$

$\frac{A}{B} = \frac{6}{5}$ $\frac{B}{C} = \frac{13}{20}$

A : B : C = 78 : 65 : 100

$2C - 4B + A = \frac{2 \times 100 - 4 \times 65 + 78}{2}$

$= 9.$

40.

P : C

10 : x

1 : 2 — Price

order reversed

$\frac{10 \times 1 + 2x}{x + 20} = \times \frac{8}{7}$

$70 + 14x = 8x + 160$

$x = 15$

P : C

10 : 15

2 : 3

41.

B = 2.5% of C

$B = \frac{25}{1000} \times 5500 = \frac{25 \times 55}{10}$

$A \times \frac{11}{5} = B \times 22\%$

$A \times \frac{11}{5} = \frac{25 \times 55}{10} \times \frac{22}{100}$

$A = \frac{55}{4}$

Sum $\frac{55}{4} \times \frac{40}{100} + \frac{25 \times 55}{10} \times \frac{20}{100}$

$= 33.$

42.

In = 100x

60 — wife

8, 8, 8 — Children

Left = $16 \times \frac{3}{5}$

Saving = $\frac{16 \times 2x}{5} = 9600$

$x = 1500$

$100x = 150000$

43.

Rem = 100 − (24 + 16)

= 60%

$\frac{60 \times 45}{100} = 5640$

100% — 22000

Rent — $\frac{22000 \times 16}{100}$

= 3520

44.

S E 9

300 500 800

| +60% | +44%

800 1152

S 52 → 1040

500 — $\frac{1040 \times 500}{52}$

= 10000

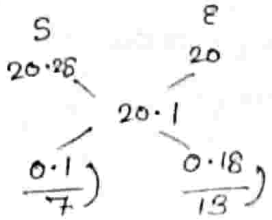
45.

S E

20.28 20

20.1

$\frac{0.1}{7}$) $\frac{0.18}{13}$)



Increase = 20.3%

46.

P	E	T	S
80000	16000	2400	61600
104000	31200	6240	66560
			128160

47.

E = cost × cons

100 : 128

cons 128 : 100

$\frac{28}{128} \times 100 = 21.875\%$

48.

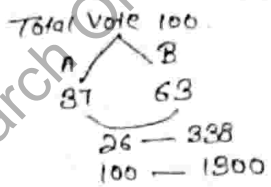
Total Vote 100

A B

37 63

26 — 338

100 — 1300



49.

Total polled vote

100

42 58

16% − 1400 = 3080

16% — 4480

1400 votes = 5%

50.

$x \times \frac{13}{20} \times \frac{97}{100} \times \frac{13}{20} = 81965$

$x = 20000$

51.

+12% −12% +10%

overall = 8.416%

108.416 — 10842

100% — 10000 ~

52.

Total Polled votes = 100%

Raju Ravi A

30 32 95 − (30 + 32)

= 33%

3% — 5136

100% — 171200

53.

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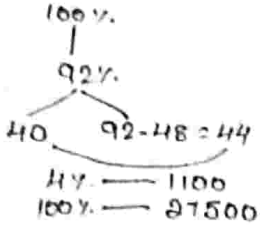


54.

$(1000-82560)\frac{4}{5}\times\frac{16}{100} = 768400$

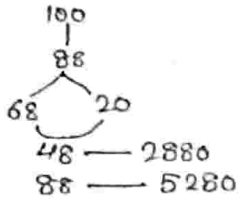
$100x = 6085685$

Invalid = 82560

$\% = \frac{82560}{6085685}\times\frac{100}{\frac{1}{5}}$

$= 6.8\%$

55.



56.

$x\times\frac{180}{100}\times\frac{115}{100}\times\frac{60}{100} = 179400$

$x = 20,000$

57.

9 : 10 (1kg — 900gm)

10 : 11 (10%+)

9 : 11

$\frac{9\times90}{100} = 8.1 \longrightarrow 20$

$11 — \frac{20\times11}{8.1}$

$= 27.16$

58.

Head

$H + G = 100 \times 2$

$2H + 4G = 348$

$2G = 348 - 200$

$G = 74$

59.

$\frac{P}{5} + \frac{Q\times2}{5} = \frac{Q\times4}{5}$

$\frac{P}{5} = \frac{4Q-2Q}{5}$

$P = 2Q$

$\frac{P}{Q} = \frac{2}{1}$) 200%

60.

BY	BA	Total
8x	5x	= 13x
13·8x	+40% 7x	+60% 20·8x

18·8x

$20.8x — 104$

$x — \frac{104}{208}\times10$

$BY = \frac{104}{208}\times16\times\frac{198}{10}$

$= 69$

61.

$\frac{7}{10}$)

3 — 5

16 — $\frac{5}{8}\times10$

New price = $\frac{140}{50}\times3$

$= 8.4$

62.

$\frac{P\text{ Income}}{Q\text{ Income}} = \frac{150}{100}$

$\frac{P\text{'s Exp}}{Q\text{'s Exp}} = \frac{6}{10} = \frac{3}{5}$

Q's Exp = $100\times80\% = 80$

P's Exp = $\frac{80\times3}{5} = 48$

P's Sav = $150 - 48 = 102$

$\% = \frac{102}{150}\times100 = 68\%$

63.

$\frac{+105}{-60}$) -65 consumption

$\% = \frac{65}{125}\times100$

$= 52\%$

64.

Earning of kavita

$\frac{20000\times12}{100} + (x-20000)\times\frac{15}{100}$

$2400 + (x-20000)\frac{3}{20}$

Earning of kalyani

$\frac{20000\times15}{100} + (x-20000)\times\frac{20}{100}$

Diff $3000 - 2400 + (x-20000)\frac{5}{20} = 1600$

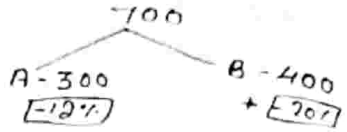
$-(x-20000)\frac{3}{20} = 1600$

$x = 160000$

kavita = $\frac{20000\times12}{100} + (160000-20000)\times\frac{15}{100}$

$= 23400.$

65.



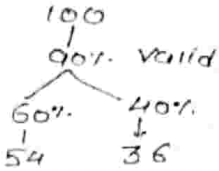
300 + 80 - 36 = 344

400 + 36 - 80 = 356

Diff 356 - 344 = 12

$\frac{234}{12}\times700 = 13650$

66.



$\frac{8850}{100}\times36 = 3186$

67.

S : I = 40 : 100

Ex = 60

$2\times\frac{21000}{60}\times100$

$= 70000$

68.

92 — 309580

88 — $\frac{309580\times88}{92}$

$= 13460\times22$

$= 296120$

69.

Total vote = 7500

Invalid " = 8%

Winner " = 54%

Looser " = 46%

$7500\times\frac{92}{100}\times\frac{8}{100}$

$= 552$

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$\frac{100(x+y)+2xy}{200+x+y}$

$\frac{-2\times20\times20}{200} = -4\%$

Loss 4%

71.

I : Ex = 80k : 45k
16 : 9

	Ex	Saving	Income
I	90	70	160
	8%		16%
	+25.6	7.2	18.4

$8\% = \frac{18.4}{70}\times100$

$= 26.29\%$

72.

60, 70, 80 ...

$S_n = \frac{n}{2}[2a+(n-1)d]$

$1210 = \frac{n}{2}[2\times60+(n-1)10]$

$2420 = n[120+(n-1)10]$

by option

$n = 11$

73.

Price 20 : 17
Con 17 : 20
3 — 5
1 — $\frac{5}{3}$

Original $p = \frac{1275}{17\times\frac{5}{3}}$

$= 45$

74.

100x

Ram 69x — Shyam $(100x-69x-53x)-100$

Diff

$53x = 630-100$

$100x = 1000$

75.

$\frac{5\times40\% + 3\times60\%}{5\times60\% + 3\times40\%}$

$= \frac{20+18}{30+12}$

$= \frac{19}{21}$

76.

100 → 98% - 500

A = 43%
B = 55% - 500

$= 500-12\% = 200$

$12\% = 300$

$98\% = 2450$

77.

Ex	Sav	Income
50	30	= 80
+15	+1	+16

$= +\frac{1}{30}\times100$

$= +3\frac{1}{3}$

78.

$\frac{280\times x}{100} = \frac{240\times15}{100} + \frac{(30\times20)}{100}$

$\frac{14x}{5} = 36+62$

$x = 35$

79.

$\frac{90000\times30}{100} + \frac{y\times40}{100} = (90000+y)\times\frac{37}{40}$

$\frac{3y}{100} = 37\times900-30\times900$

$y = 210,000$

80.

Let $x = 10\%$

10% + 10% − → 1% Loss

100 — 99 = 1

1% 100 → $\frac{100}{99}$

81.

100

Fm I = 22 — 78

5 — 18200

12 → $\frac{3640\times12}{78}$

116 → $\frac{3640\times12\times116}{78}$

$= 64960$

82.

A → 75 — 40%
B → 80 — 50%
C → 60 — 10%

$= \frac{75\times4+80\times5+60\times1}{4+5+1}$

$= 76\%$

83.

CP	SP
20	30
800	1000

$20\times800 : 30\times1000$

8 : 15

$P\% = \frac{7}{8}\times100$

$= 87.5\%$

84.

पति	आदु
50	40
↓ -5%	↓ +35%
-5	54

54 — 54
1 — 1

उत्तर → 1×5
$= 5$

85.

$x\times\frac{17}{20}\times\frac{4}{5} - 380 = 2000$

$x\times\frac{17}{20}\times\frac{4}{5} = 2380$

$x = 3500$

86.

6 - 3 = 3%

$3+3+\frac{3\times3}{100} = 6.09\%$

$= \frac{609}{100}\times500000$

$= 30450$

कुल → 530450

87.

100
|
80
↓
78.4 (बचा)

A — B

9408

$\frac{60}{100}\times78.4\% = 9408$

$100\% = \frac{9408\times10000}{6\times784}$

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88.

$x \times \frac{70}{100} \times \frac{85}{100} \times \frac{65}{100} = 162435$

$x = 420000$

89.

$100 \xrightarrow{-20\%} 80$

$80 \times \frac{97}{100} \times \frac{55}{100} = 42680$

$100\% = 100000$

वैद्य सत $= 100000 \times \frac{80}{100} \times \frac{97}{100} \times \frac{10}{100}$

$= 7760.$

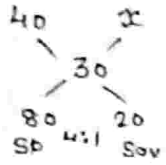
90.

40 x

30

80 20

Sp 4:1 Sav



$5 \times 30 = 40 \times 4 + x \times 1$

$x = -10\%$

10% — 750

100% — 7500 Initial

20% — 7500

100% — 37500 Income

91.

I Sp Sa

100 68 32

125 88.2 36.8

+25% +15%

$\frac{20.2}{68} \times 100 = 29\frac{12}{17}\%$

92.

$\frac{H+L}{K} = \frac{100}{142} \Rightarrow 242 \times \frac{8}{100} = 19.36$

242 — 6050

100 − 19.36 — 80.64

$80.64 \times \frac{6050}{242}$

$= 2016.$

93.

$G \times \frac{24}{25} = S \times \frac{6}{5}$

$G : S = 5 : 4$

$\frac{450}{9} \times 4$

$= 200.$

94.

$x \times \frac{68}{100} \times \frac{80}{100} \times \frac{65}{100} = 70720$

$x = 2L.$

95.

Cast Votes $= 8000 \times \frac{75}{100}$

$= 6000$

B's $= 6000 \times \frac{66}{100}$

$= 3960$

96.

H	S	M	E	C
75		89	81	92
−10		+4	−4	+7

let 85

overall devation −3

$85 + 3 = 88$

97.

Total votes $\times \frac{3}{7} \times \frac{98}{100} \times \frac{3}{7} = 9261$

$\Rightarrow$

$\Rightarrow 16800$

98.

1 : 4] 5

1 : 9

(4+1) — 175

5 — 175

99.

$x \times \frac{3}{4} \times \frac{98}{100} \times \frac{3}{4} = 9261$

$x = 16800$

100.

$A + B = 450$

$.96A = 1.20B$

$\frac{A}{B} = \frac{5}{4}$

9 — 450

4 — 200

101.

$2 \times x\% + 1 \times 80\% = 3 \times 70\%$

$x = 6.5$

102.

SAME AS 101.

103.

10% of valid votes = 1710

Valid " = 17100

Votes Cast $= \frac{17100}{.95} \times 100$

$= 18000$

Total Votes $= 18000 \times \frac{10}{9}$

$= 20000$

104.

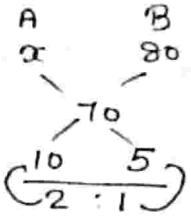
A B

x 80

70

10 5

2 : 1



$x = 70 - 5$

$= 65$

$= 6.5$

105.

5 : 6

5 : 4

5 : 6

125 : 144

1000 : 1152

+15.2↑

106.

$R \times 57 = B \times 76$

$\frac{R}{B} = \frac{4 - 4x}{3 - 3x}$

$\frac{4x - 400}{3x} = \frac{6}{5}$

$x = 1000$

$3x = 3000$

II $\frac{R}{B} = \frac{76}{57} = \frac{4}{3}$

R B

4 : 3

6 : 5

−400 0

$20 - 18 = 2 \rightarrow -(-2000)$

$3 = 3000$

107.

100x

−12%

88x − 84

R S

54x 34x − 84

$20x + 84 = 1456$

$100x = 6860$

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65% — 35%
30%
30 — 15900
100 — 53000

109.

100 +15 | 68 +6.8 | 32 +8.2

$\frac{8.2 \times 100}{32}$
= 25.62%

110.

$\frac{1}{5}$ = 20% invalid

80
B 35 | A 45
90% × 20
18
53 | 45
8%

{ A+B = 80%
A−B = 10%

111.

Total vote = 80 let
Invalid = 8
S — 20
R — 20+10+4
P — 32
R fault = 34
$\frac{34}{80} \times 100$
= 42.5%

Total Votes = 100%
Invalid = 10%
R S P
25% 25% 40%
12.5
5%
42.5%

112.

x+y+z NOTA
6A A
Winner 1st R.U 2nd R.U
x y z
2A+1500 A+900 A+750
4A+3150 = 6A
7A = 11025

113.

100x
30x | 70x−200
65% 35%
30%
$(70x-200)\frac{3}{10} = 1200$
70x = 4200
100x = 6000

65% 35%
30%
30% → 1200
100% → 4000
Now
100% = 4000 + 30% + 200 ⇒ 2.9%
then
$\frac{4200}{70} \times 100 = \boxed{6000}$

114.

58−42 = 16
16% — 2545800
100% → 15911250
70% — 15911250+365500 = 16276450
30% = 6.9m
= 7m

115.

G S
Cost 12000 10000
Present 14400 12500
20 (y) 25% (x)
$\frac{25-20}{20} \times 100 = 25\%$

116.

1000 : 2295
+129.5%
$x + 2x + \frac{2x^2}{100} = 129.5\%$
option 2x = 70
$35 + 70 + \frac{35 \times 70}{100}$
= 129.5

117.

100
−10%
90
−15%
76.5
P 78% | Q 22%
$Q = 7560000 \times \frac{76.5}{100} \times \frac{22}{100}$
= 1272348

118.

Coffee = x
tea = 7−x
40x + 30(7−x) = 240
x = 3
tea = 7−3 = 4

119.

20 30 20 30 = 10
6 8 4 −5 = 29
12 24 8 −15 10

120.

5 2 1
x y z
x+y+z = 40
5x+2y+z = 100
by options 75 = 13
y+z = 27
2y+z = 35
y = (8)
z = 19
Check 13+8+19 = 40

121.

A 59.375 | B 40.625
18.75 = 2484
100% = 13248
90% = 13248
100 = 14720
16000 : 14720
8%

122.

450+35% = 85%
50% = 450
85% = 45×17
450 : 45×17
10 : 17
70%

123.

100
m 45 | F 55
$\frac{6}{10} \times 45$ | $\frac{4}{10} \times 55$
I − 27 | = 2 − I
Lit − 18
$\frac{4}{18} \times 100 = 22.22\%$

124.

$25 + 25 - \frac{25 \times 25}{100}$: 50+6.25
43.75 : 56.25
22.22%

125.

P → R : W
1 : 5
x, 5x
20×x + 8×5x = 300
x = 5
W : R = 25₹, 5₹
+20%
30
5×Quan + 8×30 = 300
Quan = 12
20 : 12

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PROFIT & LOSS

CGL PRE 2018

Q.1 The marked price of an article is Rs. 315. It is sold for Rs.288. If there is a loss of 4%, then by what percent above the cost is the article marked?

(a)5 (b)8 (c) $5\frac{1}{2}$ (d) $6\frac{1}{2}$

Q.2 Ram bought an article for Rs. 1,240 and sold it at a loss of 25%. With this amount, she bought another article and sold it at a gain of 40% His overall percentage profit is:

(a)12 (b)$6\frac{2}{3}$ (c)5 (d)15

Q.3, Anu allows a 20% discount on the marked price of an article and still makes a profit of 25%. If she gains Rs. 44.80 on the sale of the article, then the cost price of the article is:

(a)₹188.80 (b)₹192.80 (c)₹184.20 (d)₹179.20

Q.4 Abhi bought two articles for Rs. 624. He sold one at a loss of 14% and the other at a profit of 14%. If the selling price of both the articles is equal, then the difference between their cost prices (in Rs.) is:

(a)89.64 (b)87.36 (c)89.68 (d)88.84

Q.5, Some fruits are bought at a rate of 11 for Rs. 100 and equal number at a rate of 9 for Rs. 100. If all the fruits are sold at a rate of 10 for Rs. 100, then what is the gain or loss percent in the entire transaction?

(a)Gain,5% (b)Loss,5%

(c)Gain,1% (d)Loss,1%

Q.6 A person sold 25 articles for Rs. 2500 and incurred a loss of 10%. How many articles should he sell for Rs 2400 to make a profit of 20%?

(a)16 (b)20 (c)18 (d)15

Q.7 A person sells an article at a profit of 12%. If he had purchased it for 12% less and sold it for Rs. 9 less, he would have gained 27%. What is the original cost price of the article?

(a)₹4,250 (b)₹4,000

(c)₹4,500 (d)₹3,750

Q.8 Two articles are sold for Rs. 9,720 each. On one, the seller gains 8% and on the other, he loses 10%. What is his overall gain or loss?

(a)₹380 gain (b)₹380 loss

(c)₹360 loss (d)₹360 gain

CHSL 2018

Q.8 A vender bought 40 dozen of fruits for Rs. 2400. Out of these, 30 fruits were rotten and thrown away. At what rate per dozen should e sell the remaining fruits to make a profit of 25%?

(a)₹84 (b)₹72 (c)₹90 (d)₹80

Q.9 A shopkeeper marks his goods at 25% above the cost price. He sells three-fourth of the goods at the marked price and the remaining at 40% discount on the marked price. His gains/loss percent is:

(a)Gain, 10.5% (b)Loss, 12.5%

(c)Gain, 12.5% (d)Loss, 8.75%

CPO 2019

Q.10 A bought 38 kg. Rice at Rs. 54.50/kg, 45 kg rice at Rs. 62/kg, and 55 kg rice at Rs. 48/kg. He sold the mixture at Rs. 65/kg. His loss or profit percentage is:

(a)Profit,19.6 (b)Loss, 1.7

(c)Profit,16.8 (d)Loss, 1.04

Q.11 Three partners A, B and C share profit and losses in the ratio 3:4:7. If the profit for the year before charging 30% tax is Rs. 1,10,166. What is B's share of profit after tax?

(a)₹9442.80 (b)₹31476

(c)₹22033.20 (d)₹24673.10

Q.12 A manufacture sells the product to a wholesaler at 6% profit, the wholesaler sells the product to a retailer at 8% profit and the retailer sells the product to his customer at 10% profit. The price paid by the customer is Rs. 31,482. The cost of the product to the manufacturer is:

(a)25,000 (b)26,524

(c)26,980 (d)28,306

Q.13 A sell 12 bicycles at a profit of Rs.516 per bicycle and sells 3 bicycles at a loss of Rs 129 per bicycle. If the total profit percentage on all the bicycles sold is 15% the cost price per bicycle is?

(a)₹2960 (b)₹3870 (c)₹2580 (d)₹4440

MTS 2019

Q.14 An article is sold for Rs. 6500 so as earn a profit of 4%. A second article whose cost price is Rs. 3750, is sold at a loss of 4%. What is the overall gain on or loss percent in the whole transaction?

(a)Loss 4% (b)Loss 1%

(c)Gain 1% (d)Loss 45%

Q.15 A sold an article on 15% profit for Rs. 1495. He purchased another article having cost price was equal to the first article. He sold this new article at 10% profit. What is the total profit of A?

(a)₹325 (b)₹450 (c)₹375 (d)₹425

Q.16 An article is sold for Rs. x. If it is sold at $33\frac{1}{3}\%$ of this price, there is a loss of 20%. What is the percentage profit when it is sold for Rs. x?

(a)125 (b)130 (c)140 (d)120

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CGL MAINS 2018

Q.17 Radha marks her goods 25% above the cost price. She sells 35% of goods at the marked price, 40% at 15% discount and the remaining at 20% discount. What is her overall percentage gain?
(a)11.25 (b)10 (c)11.75 (d)12.75

Q.18 An article is sold at a certain price. If it is sold at $33\frac{1}{3}\%$ of this price, there is a loss of $33\frac{1}{3}\%$. What is the percentage profit when it is sold at 60% of the original selling price?
(a)20 (b)30 (c) $33\frac{1}{3}$ (d) $17\frac{1}{3}$

Q.19 An article is sold at a certain price. If it is sold at 80% of this price, then there will be a loss of 10%. What is the percentage profit when the article is sold at the original selling price?
(a)15 (b) $12\frac{1}{2}$ (c)12 (d) $15\frac{1}{2}$

Q.20 By selling two articles for Rs. 800, a person gains the cost price of three articles. The profit percent is:
(a)140 (b)120 (c)125 (d)150

Q.21 A man sells his goods at a certain price, 20% of profit. If the price at which he buys the goods increases by 10% and he sells them at 8% higher price, then what will be his profit percent (correct to one decimal place)?
(a)21.4 (b)32.4 (c)22.7 (d)17.8

Q.22 35% of goods were sold at a profit of 65%, while the remaining were sold at x% loss. If the overall loss is 12%, then what is the value of x? (correct to one decimal place)
(a)50.6 (b)53.5 (c)51.8 (d)52.4

Q.23 A shopkeeper allows an 18% discount on the marked price of an article and still makes a profit of 23%. If he gains Rs. 18.40 on the sale of the article, then what is the marked price of the article?
(a)₹120 (b)₹125 (c)₹146 (d)₹140

CHSL 2019

Q.24 Three articles are bought at Rs. 200 each. One of them is sold at a loss of 10%. If the other two articles are sold so as to gain 20% on the whole transaction, then what is the gain percent on the two articles?
(a)32 (b)35 (c)28 (d)30

Q.25 The total cost price of two articles is Rs. 2000. One of them is sold at a profit of 12% and the other at a loss of 12%. The overall gain in the transaction is 1.2%. The cost price of the article for which there was a profit was:
(a)₹1120 (b)₹1100 (c)₹1080 (d)₹1050

Q.26 Seema purchased mobile and got 20% discount on it. Had she got 25% discount, she would have saved Rs. 1,000 more. How much did she pay for the mobile?
(a)25,000 (b)22,000
(c)16,000 (d)20,000

Q.27 For every Rs. 5 worth of revenue, a retailer earns Rs. 1. If the cost of the goods was Rs. 4800, then how much did he earn?
(a)₹600 (b)₹900 (c)₹1200 (d)₹1120

CPO 2019

Q.28 I purchase 100 kg of tea and sell it for a profit to the extent of what I would have paid for 40 kg. What is my profit percentage?
(a)30% (b)25% (c)20% (d)40%

Q.28 By selling an article for Rs. 1,134, Anu suffers as much loss as she would have gained by selling it at 10% profit. If she sells it for Rs. 1,354.50, then her profit percentage is:
(a)8.4 (b)8 (c)7.5 (d)9

Q.29 A person sold a chair at a profit of 13%. Had he sold it for Rs. 607.50 more, he would have gained x%. If the cost price of the chair is Rs. 3,750, then the value of x is:
(a)28.4 (b)32 (c)29.2 (d)30

Q.30 Mangos are bought at a rate of Rs. 10,000 per ton. If one-third of the total mangoes are sold at a loss of 4% then at what price (per ton) should the remaining mangoes be sold so as to gain 30% on the whole transaction?
(a)₹15000 (b)₹13500 (c)₹14700 (d)₹14600

Q.31 A person bought an article at a 30% discount on its marked price. The person then sold it at 30% profit for Rs. 427.70. What was the marked price of the article?
(a)₹470 (b)₹450 (c)₹500 (d)₹480

CGL PRE 2019

Q.32 A person buys 5 tables and 9 chairs for Rs. 15,400. He sells the tables at 10% profit and chairs at 20% profit. If his total profit on selling all the tables and chairs is Rs. 2,080, what is the cost price of 3 chairs?
(a)₹1,800 (b)₹1,740 (c)₹1,860 (d)₹1,890

Q.33 A sells an article to B at a loss of 20%. B sells it to C at a profit of 12.5% and C sells it to D at a loss of 8%. If D buys it for Rs. 248.40, then what is the difference between the loss incurred by A and C?
(a)₹36.80 (b)₹38.40 (c)₹42.60 (d)₹39.20

Q.34 A man sold two gifts at Rs. 30 each. On one gift he gained 18% and on the other he lost 18%. What is his overall gain/loss(in Rs.)? (Approximate)
(a)Loss of ₹2 (b)Gain of ₹2
(c)Loss of ₹2.5 (d)Gain of ₹1.75

CHSL 2020

Q.35 A sells an item at 20% profit to B, B sells the same at 10% profit to C and receives Rs. 1,32,000. Had C purchased the same item from A, he would have spent 5% less than what he spent with B. What profit would A have made then?
(a)₹25,540 (b)₹24,450
(c)₹24,540 (d)₹25,400

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Q.36 The difference between the selling price of some articles if sold for Rs. 12 per article instead of Rs. 9 per article is Rs. 150. If the cost price of these articles is Rs. 250, then find the selling price of 21 articles if profit earned is 20%.
(a)₹125 (b)₹136 (c)₹130 (d)₹126

Q.37 A shopkeeper pays 12% of the cost price as tax while purchasing an item whose cost is Rs. 500. He wants to earn a profit of 20% after giving a discount of 16% on the marked price. So, the marked price should be:
(a)₹960 (b)₹780 (c)₹800 (d)₹840

Q.38 A person purchased 40 items at some price. He sold some items at a profit of 30% by selling them at a price equal to the cost price of 26 items. The remaining items are sold at 18% profit. The total profit percentage is:
(a)25% (b)28% (c)24% (d)27%

CGL MAINS 2019

Q.39 On selling an article for Rs. 123.40, the gain is 20% more than the amount of loss incurred on selling it for Rs. 108. If the article is sold for Rs. 120.75, then what is the gain/loss per cent?
(a)Loss 2.5% (b)Gain 5%
(c)Loss 5% (d)Gain 2.5%

Q.40 Shashi sells two articles for Rs. 5000 each with no loss and no profit in the overall transaction. If one article is sold at $16\frac{2}{3}\%$ loss, then the other is sold at a profit of:
(a)$16\frac{2}{3}\%$ (b)25% (c)$18\frac{1}{3}\%$ (d)24%

Q.41 On selling 38 balls at Rs. 2,240, there is a loss equal to the cost price of 6 balls. The cost price of a balls is equal to:
(a)₹70 (b)₹80 (c)₹60 (d)₹50

CGL PRE 2020

Q.42 A shopkeeper sold two articles for ₹ 10591 each. On one he gained 19% and on the other he lost 11%. What was his overall gain or loss percent (correct to on decimal place)?
(a)Loss 10% (b)Profit 5%
(c)Loss 2.7% (d)Profit 1.8%

Q.43 A shopkeeper marks his goods 30% higher than the cost price and allows a discount of 10% on the marked price. In order to earn 6.5% more profit, what discount percent should he allow on the marked price?
(a)5.5 (b)4 (c)6 (d)5

Q.44 On selling an article for ₹ 246.80, the gain is 20% more than the amount of loss incurred on selling it for ₹216. If the article is sold for ₹220.75, then what is the gain/loss percent (correct to nearest integer)?
(a)Loss 4% (b)Profit 7%
(c)Loss 5% (d)Profit 3%

Q.45 A shopkeeper allows 16% discount on every item. Even after giving the discount, he makes a profit of 8%. If he gives 8% discount instead of 16% on an item marked for ₹1800, then what will be his profit percent? (Correct to two decimal places)
(a)18.29 (b)19 (c)18 (d)18.31

Q.46 By selling article for ₹640, a person loses 15% of its selling price. At what price (in ₹) should he sell it to gain 15% on its cost price?
(a)832 (b)836.60 (c)835 (d)846.40

Q.47 The cost price and the marked price of an item are ₹720 and ₹900 respectively. When it is sold at a discount of x%, the profit is $\frac{5x}{3}\%$. What is the value of x?
(a)$8\frac{4}{7}$ (b)$5\frac{5}{7}$ (c)$7\frac{4}{7}$ (d)$5\frac{4}{7}$

Q.48 The marked price of an article is ₹240. A shopkeeper sells it by allowing 18% discount on its marked price and still gains 23%. What is the cost price (in ₹) of the article?
(a)180 (b)160 (c)200 (d)150

Q.48 A shopkeeper buys an article at 30% discount on its marked price and sells it at 5% discount on its marked price. If he earns a profit of ₹65, then what is the marked price (in ₹) of the article?
(a)227.50 (b)325
(c)260 (d)292.50

Q.49 By selling an article for ₹131.25, a trader gains as much percent as the number representing the cost price of the article. In order to earn 40% profit, at what price (in ₹) should he sell the article?
(a)140 (b)105 (c)100 (d)75

Q.50 An article is marked 27% above its cost price. If x% discount is allowed on the marked price and still there is a profit of 6.68%, then what is the value of x?
(a)12.5 (b)16 (c)20 (d)15

Q.51 A shopkeeper sold two items. The selling price of the first item equals to the cost price of the second item. He sold the first item at a profit of 20% and the second item at a loss of 10%. What is this overall profit/loss percent?
(a)Profit, $4\frac{7}{11}\%$ (b)Profit, $3\frac{7}{11}\%$
(c)Loss, $8\frac{1}{3}\%$ (d)Loss, $4\frac{6}{11}\%$

Q.52 A fruit merchant bought some bananas. One fifth of them got rotten and were thrown away. He sold two fifth of the bananas with him at 15% profit and the remaining bananas at 10% profit. Find his overall loss or profit percent?
(a)Loss, 10.4% (b)Loss, 9.6%
(c)Profit, 9.6% (d)Profit, 10.4%

Q.53 Radha bought a fridge and a washing machine together for ₹57300. She sold the fridge at a profit of 15% and washing machine at a loss of 24% and both are sold at the same price. The cost price of washing machine (in ₹) is:
(a)28650 (b)22800 (c)34500 (d)24500

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Q.54 A dealer bought some toys for ₹1800. He sold 40% of these at a loss of 15% and $33\frac{1}{3}\%$ of the remaining toys at 20% profit. At what percent profit should he sell the remaining toys to earn an overall profit of 10%?
(a)24% (b)25% (c)30% (d)20%

Q.55 A shop keeper sold an article at four-fifth of the marked price and suffered a loss of $3\frac{1}{3}\%$. Find the profit percent, if he sold the article at the marked price. (correct to nearest integer)
(a)22 (b)18 (c)20 (d)21

CHSL 2020

Q.56 By selling an article for ₹11,70, Elisa suffers as much as loss she would have gained by selling it at a profit of 22%. If she sells it for ₹1,450, then her profit/loss percent (correct up to one decimal place) is:
(a)Loss, 3.3 (b)Loss, 26.2
(c)Profit, 3.3 (d)Profit, 26.2

Q.57 The marked price of an article is ₹480. A person buys it at two successive discounts of 15% and 10%. He sells it at a profit of 25%. What is his profit (in ₹)?
(a)90.60 (b)91.80 (c)95.40 (d)93.20

Q.58 A bought an article for ₹4,800 and sold it at a loss of 30%. With this amount, he bought another article and sold it at a gain of 60%. What was his overall gain/loss?
(a)Gain 12% (b)Gain 10%
(c)Loss 18% (d)Loss 15%

Q.59 An article was sold at a loss of 24%. If it were sold for ₹1,596 more, then there would have been a gain of 18%. The cost price of the article is:
(a)₹3,600 (b)₹3,800 (c)₹3,400 (d)₹4,200

Q.60 Joseph bought two woollen jackets for ₹2,100 and ₹3,150, respectively. By selling the first at a gain of k% and the second at a loss of k%, he found that the selling price of both is the same. What is the value of k?
(a)22.64 (b)15 (c)20 (d)25

Q.61 A bought an article for ₹900 and sold it to B at 25% profit. B sold this article to C. And C sold it at loss of 10% for ₹1,350. What is the profit percent of B (nearest to integer)?
(a)30 (b)35 (c)33 (d)34

Q.62 An article is sold at a certain price. If it is sold at $33\frac{1}{3}\%$ of this price, there is a loss of $33\frac{1}{3}\%$. What is the percentage profit or percentage loss when it is sold at 40% of the original selling price?
(a)Profit 18% (b)Loss 20%
(c)Loss 12% (d)Profit 15%

Q.63 By selling a car for ₹6,32,500, a showroom owner makes a profit of 15%. If he sold the car at ₹8,10,000, then what would be the profit percentage (correct to one decimal place)?
(a)44.8% (b)41.5% (c)47.3% (d)51.4%

Q.64 A marks her goods 25% above the cost price. She sells 25% of the goods at the marked price, 60% at 25% discount and the remaining at 10% discount. What is her overall gain or loss percent?
(a)Loss 18.175% (b)Loss 3.125%
(c)Gain 15.124% (d)Gain 4.375%

Q.65 The marked price of an article is ₹1,360. If a shopkeeper sold the article at 15% loss after giving 25% discount, then the cost price of the article is:
(a)₹1,600 (b)₹1,400 (c)₹1,200 (d)₹1,500

Q.66 Sulekha bought 36kg of sugar for ₹1,040. She sold it at a profit equal to the selling price of 10kg of it. What is the selling price (in ₹) for 5 kg of sugar?
(a)215 (b)220 (c)235 (d)200

Q.67 A shopkeeper sells two refrigerator sets at the same price. He gains 40% on one refrigerator and loses 40% on the other. What is his net loss percentage in the whole transaction?
(a)14% (b)18% (c)16% (d)12%

Q.68 The profit earned after selling an article for ₹ 8,579 is the same as the loss incurred after selling the article for ₹6,341. The profit percentage is:
(a)15% (b)20% (c)18% (d)12%

Q.69 A shopkeeper bought 95 dozen oranges at ₹4.50 each. 7 dozen oranges were rotten and so were discarded. He sold the remaining oranges at ₹78 per dozen. What is his profit or loss per cent (to the nearest integer)?
(a)Profit, 34% (b)Loss, 34%
(c)Profit, 45% (d)Loss, 45%

Q.70 A shopkeeper sold an article for ₹3,750. If he had charged 24% less, even then he would have earned a profit of 14%. What is the original cost of the article?
(a)₹2,717 (b)₹3,289 (c)₹2,850 (d)₹2,500

CHSL 2020

Q.71 By selling 92 kg of wheat, a person gains the selling price of 12 kg of it. His gain percentage is:
(a)15% (b)18% (c)12% (d)16%

Q.72 A man sells two articles for ₹620 each, one at a profit of 24% and the other at a loss of 24%. What is his loss/profit percent int the whole transaction?
(a)Profit,12 (b)Loss, 5.76
(c)Loss, 12 (d)Profit, 5.76

Q.73 A shopkeeper buys some notebooks at the rate of 12 for ₹222, and an equal number of notebooks at 10 for ₹225. If he

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sells all the notebooks at a profit of 20%, then the selling price of 15 notebooks is:

(a)₹369 (b)₹376.5 (c)₹302.40 (d)₹360

Q.74 Two wrist watches were sold for ₹1,980 each. One wrist watch was sold at a profit of 10% and the other one at a loss of 10%. The entire transaction resulted in:

(a)a loss of ₹99 (b)a gain of ₹99
(c)a loss of ₹40 (d)no gain no loss

Q.75 A man buys goods for ₹8,000. He sells 30% of those goods at a profit of 12% and 40% of the remaining goods at a profit of 25%. At what profit percentage should he sell the remaining goods to gain 30% in the entire transaction (correct to one decimal place)?

(a)46.2% (b)48.4% (c)42.6% (d)31.6%

Q.76 By selling an article at $\frac{7}{12}$ of its selling price, a man loses 16%. If he sells it at 90% of its original selling price, then what will be the profit percentage?

(a)26.4% (b)32.5% (c)29.6% (d)30.2%

Q.77 A member announces 25% discount on the price of a shirt. If one needs to have a total rebate of ₹875 and the price of each shirt is ₹250, then how many shirts should the person purchase?

(a)12 (b)9 (c)15 (d)14

Q.78 A shopkeeper charges ₹1.50 to photocopy a sheet paper and a discount of 5.5% is given on all photocopies done after 400 sheets. How much will it cost to photocopy 800 sheets of paper?

(a)₹1,160 (b)₹1,276 (c)₹1,167 (d)₹1,176

Q.79 A shopkeeper bought a machine for ₹4600 and spent ₹500 on its repairs and transport. He marked the machine at 8% above the overall cost price. If he sold the machine for ₹4681.80 after giving x% discount, then the value of x is:

(a)15 (b)20 (c)18 (d)12

Q.80 The marked price of an article is ₹5320. It is subject to two successive discounts, the first being 15%, and the second at a ratio of 20% of the first. What is the selling price (to nearest ₹) of the article?

(a)₹4127 (b)₹4522
(c)₹4386 (d)₹4000

SSC SELECTION PHASE IX

Q81. The cost price of two articles A and B is the same. Article A is sold at a loss of 24% and article B is sold for Rs270 more than the selling price of A. if the net profit by selling both the articles is 12%, then what is the selling price (in Rs) of article B?
(a) 555 (b) 575 (c) 645 (d) 610

Q82. Anup bought some pens for Rs9,500. He sold 40% pens at a loss of 12% and one-third of the remaining pens at a profit of 25%. At what percent profit should he sell the remaining pens, so as to earn a profit of 10% I the entire transaction?
(a) 24.5% (b) 25.8% (b) 24% (d)20%

Q83. A shopkeeper gains 20% when he sells an article at a 20% discount on its marked price. If the cost price of the article is reduced by 20% and he wants to earn a profit of 26%, then how much per cent discount should he give on the same marked price of the article?
(a) 30.2% (b) 32.8% (c) 35.2% (d) 30.6%

Q84. On selling an article for Rs246.80, the gain is 20% more than the amount of loss incurred on selling it for Rs216. If the article is sold for Rs320.75, then what is the percentage (correct to one decimal place) profit /loss?
(a) Loss of 35.9% (b) Profit of 39.5%
(c) Profit of 27.8% (c) Loss of 28.7%

Q85. A man buys an article at 16 for Rs1,200 and an equal number of articles at for Rs960. He sells all the articles at 15 for Rs1,350. His profit percentage in the entire transaction is (correct to one decimal place):
(a) 14.8% (b) 15.8% (c) 15.2% (d) 33.3%

Q86. A merchant fixes the sale price of his goods at 31% above the cost price. He sells his goods at 13% less than the fixed price. His profit percentage is:
(a) 15.71% (b) 17.18% (c) 18.71% (d) 13.97%

Q87. A retailer gives 36% discount to his customer on the marked price of an article. In this transaction he earns a profit of 36% on the article. If the article costs Rs4,200 to the retailer, what is its marked price (in Rs)?
(a) 8,925 (b) 9,925 (c) 9,950 (d) 8,950

Q88. A man sells two laptops for Rs40,548 each: gaining 24% on one and losing 20% on the other. What is his gain/loss percentage overall (correct to two decimal places)?
(a) 3.75% (b) 2.35% (c) 3.45% (d) 2.75%

Q89. A shopkeeper marks his good at 20% above the cost price. He sells 40% of the goods at the marked price and the remaining at 30% discount on the market price. His gain/loss percentage is:
(a) 1.6% loss (b) 3.3% gain
(c) 2.3% loss (d) 3.6% gain

Q90. By selling an article at $\frac{9}{11}$ of its actual selling price, a trader incurs a loss of 10%. What will be the profit percentage, if the article is sold for 8% less than its selling price?

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(a) $1\frac{1}{3}$ (b) $1\frac{1}{2}$ (c) $1\frac{1}{5}$ (d) $1\frac{1}{4}$

Q91. A shopkeeper makes a profit of 20% by selling an article. Had he bought the article for Rs 50 less and sold it at the same price, he would have made a profit of 25%. Find the cost price (in Rs) of the article.
(a) 1,150 (b) 1,250 (c) 1,100 (d) 1,000

Q92 The marked price of an article is Rs1,000, if is sold for Rs712.89 after three successive discount on the marked price, one of 10% and two of x% each. What is the value of x?
(a) 11 (b) 15 (c) 13 (d) 12

SSC CGL PRE 21

Q93. A person sold an article at a loss of 18%. Had he sold it for Rs960 more, he would have gained 12%. If the article is sold for Rs3,840, then how much is the profit percentage?
a) 15% b) 24% c) 20 d) 21%

Q94. A shopkeeper allows 28% discount on the market price of an article and still makes a profit of 20%, if he gains Rs3,080 on the sale of one article, then what is the selling price (in Rs) of the article?
a) 14,880 b) 18,480
c) 18,840 d) 10,884

Q95. A tea seller used to make 50% of profit by selling tea at Rs9 per cup. When the cost of ingredients increased by 25%, he started selling tea at Rs10 per cup. What is his profit percentage now?
a) $33\frac{2}{3}$ b) 30 c) $33\frac{1}{3}$ d) 25

Q96. P and Q start a shop with a capital of Rs1,50,000 and Rs4,50,000, respectively. After a year, out of the profit of Rs1,60,000. P gets his share of profit plus some money that is not a part of the profit, as his salary. If P gets a total of Rs70,000, what is the salary (in Rs) he received?
a) 40,000 b) 30,000
c) 25,000 d) 50,000

Q97. A shopkeeper bought 40 pieced of an article at a rate of Rs50 per item. He sold 35 pieces with 20% profit. The remaining 5 pieces were found to be damaged and he sold them with 10% loss. Find his overall profit percentage.
a) 30% b) 32.5% c) 16.25% d) 10%

Q98. A shopkeeper bought a table for Rs4,600 and a chair for Rs1,800. He sells the table with 10% gain and the chair with 6% gain. Find the overall gain percentage.
a) $7\frac{3}{4}$ b) $8\frac{2}{8}$ c) 8 d) 16

Q99. The cost prices of two articles A and B are in the ratio 4 : 5. While selling these articles, the shopkeeper gains 10% on article A and 20% profit on article B, and the difference in their selling prices is Rs480. Find 30% of the total cost price (in Rs) of both the articles.
a) 1,250 b) 810 c) 900 d) 1,000

Q100. The selling price of a mobile phone is Rs59,620 and it was sold at 8.4% profit. The cost price (in Rs) of the mobile phone is:
a) 52,000 b) 55,000
c) 45,000 d) 50,000

MTS 2020

Q101. A man sold a radio and a TV set together for Rs. 30,400. Thereby making a profit of 25% on the radio and 10% on the TV set. By selling them together for Rs. 30,700. He would have made a 10% profit on the radio and 25% on the TV set. The cost price of the radio is:
(a) 9,000 (b) 8,000 (c) 10,000 (d) 12,000

Q102. Amita buys 100 apples at the rate of 12 for Rs 100.80 and 200 apples at the rate of 15 for Rs 117. It was found that 10% of the apples were spolit. She sold all the apples at 20 for Rs 204. Her profit percentage in the entire transaction is:
(a) 15.25% (b) 14.25% (c) 14.75% (d) 15.5%

Q103. A retailer purchased 50 kg of a vegetable from a wholesale market. He sold half of it at a profit of Rs 450., and the rest at a loss Rs 275. What was the difference (in Rs) between the two selling prices per kg of the vegetable?
(a) 12 (b) 7 (c) 29 (d) 18

Q104. The difference between the selling prices of some apples. If sold for Rs 12 apple instead of Rs 9 per apple, is Rs 870. If total cost price of all the apples is Rs 2,320, then find the selling price of one apple if the profit earned is 25%.
(a) Rs 10 (b) Rs 12 (c) Rs 8 (d) Rs 15

Q105. A shopkeeper bought 600 pens. He sold 480 of them for the price he paid for 600 pens, 100 pens at 10% higher rate than that at which he sold 480 pens, and the rest at the cost price. His profit percentage in the transaction is:
(a) 25% (b) 28.5% (c) 26.25% (d) 27%

Q106. Three articles are bought at Rs 180 each. One of them is sold at a loss of 10%. If the other two articles are sold so as to gain 25% on the whole transaction. Then what is the gain percentage on the two articles?
(a) 30% (b) 37.5% (c) 42.5% (d) 45%

SSC CGL MAINS 2020

Q107. An article is sold at a certain price. If it is sold at $33\frac{1}{3}$% of this price, there is a loss of $33\frac{1}{3}$% what is the percentage profit if the article is sold at 80% of its original selling price?
(a) 40% (b) 70% (c) 50% (d) 60%

Q108. A shopkeeper marks an article at such a price that after giving a discount of $12\frac{1}{2}$% on the marked price, he still earns a profit of 15%. If the cost price of the article is Rs.385, then the sum of the marked price and the selling price (in Rs.) of the article is:
(a) 948.75 (b) 849.50 (c) 984.75 (d) 954.75

Q109. A lady sold an article for Rs.960 at some profit. Had she sold it for Rs.800, then there would have been a loss equal to $\frac{1}{3}$

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of the initial profit. What was the profit percentage of the article?

(a) $\frac{150}{7}$% (b) $\frac{50}{7}$% (c) $\frac{10}{7}$% (d) $\frac{100}{7}$%

DP 2022

110. A person sold an item to B at 38% gain and B sold it to C at a loss of 28%. If C bought the item for Rs9936, then at what price did A purchase it?

a) Rs15,000 b) Rs8,000 c) Rs10,000 d) Rs12,000

Q111. A dishonest shopkeeper sells sugar at Rs20 per kg which he bought at Rs15 per kg. Also, he gives 850 gm instead of 1000 gm. His actual profit or loss percentage is:

a) 45.45% profit b) 42.56% loss
c) 50.12% loss d) 56.86% profit

Q112. A dealer purchased a water cooler for Rs5800. He allows a discount of 12% on its marked price and still gains 10%. Find the marked price of the water cooler.

a) Rs7220 b) Rs6880 c) Rs7250 d) Rs7280

Q113. Nikita would gain 20% by selling a table fan for Rs.840 and would gain 12% by selling a wall clock for Rs1008. She sells the table fan for Rs980, what is the least price for which she must sell the wall clock to avoid any loss on the two together?

a) Rs620 b) Rs600 c) Rs660 d) Rs640

Q114. A shopkeeper sells guavas worth Rs.22 per kg to Anand and Sakshi for Rs.25 per kg each. He sold 950 g to Anand instead of 1 kg. He sold 'X' g instead of 1 kg to Sakshi by using faulty weights. If he makes a total profit of Rs.7.76 by selling both, then what is the value of 'x'?

a) 980 g b) 970 g c) 960 g d) 985 g

Q115. A vegetable seller sells potatoes at Rs22/kg which he purchased at Rs18/kg. but he gives only 850 grams of potatoes instead of 1 kg while selling. What is the actual percentage profit earned by the seller ?

a) 30.45% b) Rs42.79% c) 45.29% d) Rs43.79%

Q116. A merchant buys 'a' number of goods for Rs b and sells 'b' number of goods for Rs a. if b < a, then in the whole outlay, he makes:

a) 100 $\frac{(a^2-b^2)}{b^2}$% gain b) 100 $\frac{(a^2-b^2)}{b^2}$% loss
c) 100 $\frac{(b^2-a^2)}{b^2}$% loss d) 100 $\frac{(b^2-a^2)}{b^2}$% gain

Q117. A person sold his book for Rs96 and got a percentage profit equal to the cost price of the book. The cost price of the book is:

a) Rs60 b) Rs80 c) Rs50 d) Rs70

CPO 22

Q118. A tradesman marks his goods at 26% above the cost price. He allows his customer a discount of 12% on the marked price. His profit per cent is:

a) 10.88% b) 11.08% c) 10.50% d) 10%

Q119. A seller uses faulty weight in place of a 2 kg weight and earns a 25% profit. He claims that he is selling on the cost price in front of the customers but uses a faulty weight. How much error is there in the 2 kg weight to gain 25%?

a) 250 g b) 400 g c) 500 g d) 300 g

Q120. The cost price of an article is Rs1200. On buying four such articles, the customer gets one for free. If the selling price of each articles is Rs1800, then determine the net percentage profit earned by the shop keeper on selling four articles.

a) 12% b) 20% c) 18% d)15%

Q121. A shopkeeper gives 20% commission on the retail price of one article and earns 5% profit. If his commission is reduced by 10%, then what is his approximate profit percentage? (Nearest integral value)

a) 18% b) 10% c) 15% d) 8%

Q122. A wrist watch is sold for Rs1200 at a profit per cent equal to its cost price. Find the cost price of the wrist watch.

a) Rs400 b) Rs250 c) Rs350 d) Rs300

CGL PRE 22

Q123. A dishonest dealer sells a product at 11% loss on cost price, but uses 22% less weight. What is his percentage profit or loss?

a) 14.1% loss b) 14.1% gain
c) 11.4% gain d) 11.4% loss

Q124. A Microwave oven is sold in Hyderabad for Rs.M. A retailer, Elahi from Hyderabad went to Madras and bought it for 25% less (when compared to the price in Hyderabad). He spends Rs1000 on transport to bring it from Madras to Hyderabad. He sold it in Hyderabad for Rs.M. making a profit of 10%. Find the value of M (in Rs).

a) 6,305.8 b) 6,258.8 c) 6,285.7 d) 6,527.9

Q125. A and B invested their money in a business in the ratio of 9 : 5. If 10% of the total profit goes for charity and A's share is Rs29,840, what is the total profit (in Rs to the nearest integer)?

a) Rs51,745 b) Rs55,715 c) Rs57,545 d) Rs51,575

Q126. A shopkeeper advertises for selling cloth at 7% loss. However, by using a false scale of length 1 metre he actually gains 24%. What will be the actual length he uses instead of 1 metre?

a) 75 cm b) 31 cm c) 76 cm d) 93 cm

Q127. A shopkeeper has 2220 kg of rice. A part of which he sells at a 20% profit and the rest at a 12% profit. He gains 18% on the whole. The quantity (in kg) sold at a 12% profit is:

a) 555 b) 1210 c) 1665 d) 425

Q128. A businessman cheats by using faulty weights, to the tune of 12% each time, when buying and selling material. What is the rise in his profit percentage using faulty weights only?

a) 22% b) 27.27% c) 24% d) 26.32%

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Q129. The price of some wooden furniture increases by 65% when it passes through three hands. If the first and second sellers made a profit of 20% and 25%, respectively, then find the profit percentage of the third seller.
a) 10% b) 12.5% c) 16% d) 8%

Q130. A trader has a weighing balance that shows 1300 g for a kg. He further marks up his cost price by 15%. The net profit percentage is:
a) 48.5% b) 49.5% c) 50% d) 45%

Q131. Ram loses $12\frac{1}{2}\%$ of his money and after spending 75% of the remainder, is left with Rs630. How much money did Ram have initially?
a) Rs2,080 b) Rs2,880
c) Rs2,205 d) Rs2,808

Q132. What will be the cost price of the goods if a shopkeeper allows a discount of 10% on the marked price of Rs100 and gains 8% (rounded off the nearest integer)?
a) Rs83 b) Rs86 c) Rs87 d) Rs81

Q133. Ramesh claims that he is selling onions at Rs36 per kg, which costs him Rs40 per kg, but he gives 800 grams instead of 1 kg. find Ramesh's percentage gain or loss.
a) gain 13.5% b) loss 13.5%
c) loss 12.5% d) gain 12.5%

Q134. A shopkeeper sells an article at $13\frac{1}{2}\%$ loss. If he sells it for Rs1,274 more, then he gains 11%. What is the cost price of the article?
a) Rs 4874 b) Rs 4800 c) Rs 5200 d) Rs 5274

Q135. Ramesh purchases a table and a chair for Rs3900. He sells the table at a profit of 8% and the chair at a profit of 16%. He earns a profit of Rs540. What is the difference between the original price of the table and the chair?
a) Rs 2000 b) Rs 1800 c) Rs 1900 d) Rs 1700

CGL MAINS 2022

Q136. Products pass successively through the hands of three traders and each of them sells his goods at a profit of 30% of his cost price. If the last trader sold the products for Rs.300, then how much did the first trader pay for them?
a) Rs.330.55(approx) b) Rs.136.55 (approx)
c) Rs.240.55 (approx) d) Rs.137.55 (approx)

Q137 How many kilogram of rice costing Rs 60 per kg must be mixed with 24 kg of rice costing Rs 42 per kg so that there may be a gain of 12% by selling the mixture at Rs 56 per kg?
a) 22 kg b) 20 kg c) 19.2 kg d) 21.2 kg

CHSL PRE 22

Q138 A person bought 80 pens at the rate of Rs 80 per pen. He sells 40 pens at a loss of 20 percent. If profit of 20 percent is earned on the all pens together, then what will be the profit percentage on the remaining 40 pens?
a) 80 percent b) 60 percent
c) 90 percent d) 70 percent

Q139 Ram purchases two watches for Rs 3500 by selling one watch at a profit of 25 percent and the other at a loss of 10 percent he neither earns profit nor suffers loss in the whole transaction. What is the cost price of each watch ?
a) Rs 1000 and Rs 2500 b) Rs 1500 and Rs 2000
c) Rs 1250 and Rs 2250 d) Rs 1500 and Rs 1720

Q140 An article is sold at 10 percent loss. If its cost price is decreased by Rs 5 and selling price is increased by Rs 8, then profit of 10 percent is earned on it. What is the original selling price of the article ?
a) Rs 68.5 b) Rs 62.5
c) Rs 67.5 d) Rs 60.75

Q141 A dealer sells two machines at the rate of Rs 15000 per machine. On one he earns a profit of 20 percent and on the other he loses 40 percent. What is his profit/loss percentage in the whole transaction ?
a) 10 percent profit b) 10 percent loss
c) 20 percent profit d) 20 percent loss

Q142 A shopkeeper allows 20 percent discount on the marked price of an article and he suffers a loss of 5 percent. If the article is sold at marked price, then what will be the profit percentage ?
a) 16.25 percent b) 8.33 percent
c) 17.25 percent d) 18.75 percent

Q143 20 percent of marked price is equal to 50 percent of cost price. If no discount is given, then what will be the profit percentage ?
a) 120 percent b) 150 percent
c) 125 percent d) 100 percent

Q144 A trader sells an article at 20 percent profit. If he buys it at half of the cost price and sells at the same selling price as before, then what will be the profit percentage ?
a) 240 percent b) 40 percent
c) 140 percent d) 60 percent

Q145 The cost price of two dozen bananas is Rs 30. After selling 15 bananas at the rate of Rs 12 per dozen, the shopkeeper sells the remaining bananas at the rate of Rs 5 per dozen. What is the loss percentage ?
a) 22.5 percent b) 37.5 percent
c) 30 percent d) 25 percent

Q146 Ritika purchased 'x' kg wheat at Rs 30/kg and sold 8 kg of this at Rs 'x' per kg and remaining at Rs 45/kg. Overall profit percent earned is 10%, then what quantity of wheat Ritika sold at Rs45/kg ?
a) 18 kg b) 14 kg c) 10 kg d) 16 kg

Q147 The marked price of a trouser is four time the cost price. To earn 64 percent profit, what should be the discount percentage ?
a) 59 percent b) 55 percent

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c) 62 percent d) 65 percent

Q148 If 60 chairs are bought for Rs 24,560, then how many chairs must be sold Rs 24,560 to earn a profit of 20 percent ?
a) 30 b) 40 c) 50 d) 60

Q149 A person buys three spectacles at the rate of Rs4,000 per spectacles. He sells first spectacles at a profit of 30 percent, sells second spectacles at a loss of 10 percent and sells third spectacles at a loss of 10 percent. What is the total percentage of profit earned in the whole transaction?
a) 2.18 percent b) 7.14 percent
c) 3.33 percent d) 5.41 percent

Q150 On selling a table for Rs 210 and Rs 420 there will be loss of L_1% and L_2% respectively. If $L_1 - L_2 = 7$, then what is the cost price of table ?
a) Rs 3000 b) Rs 7000
c) Rs 5000 d) Rs 4000

Q151. A shopkeeper sells a book at a loss of 40 percent. Had he sold the book for Rs 120 more, then he would have suffered a loss of 10 percent. To earn a profit of 10 percent, what should be the selling price of the book ?
a) Rs 440 b) Rs 400
c) Rs 500 d) Rs 650

Q152 The cost price of 44 items is the same as the selling price of x items. If the profit is 10%, then what is the value of x?
a) 55 b) 40 c) 60 d) 50

Q153 The marked price of a chair is 30 percent more than its cost price. If the chair is sold for Rs 200 after a discount of Rs 40, then what will be the profit percentage ?
a) 7.28 percent b) 8.13 percent
c) 9.66 percent d) 8.34 percent

Q154 Vinay sells an article at a profit of 20 percent. If both the cost price and selling price are reduced by Rs 20, then the profit becomes 40 percent. What is the initial cost price ?
a) Rs 40 b) Rs 90 c) Rs 60 d) Rs 50

ICAR & SELECTION PHASE XI

Q155 A merchant bought two qualities of rice at the rate of Rs 120/kg and Rs 220/kg. In 72 kg of the second quality rice, how much rice (in kg) of the first quality should by mixed so that the resulting mixture may be sold at the rate of Rs 280/kg to earn a profit of 40%?
1. 22 2. 18 3. 20 4. 15

Q156 A dishonest shopkeeper professes to sell grains at cost price, but he uses a weight of 935 g for 1 kg weight. Find his gain percentage.
1. 6.95% 2. 6.59% 3. 5.96% 4. 6.5%

Q157 Mukesh sells almonds at the cost price but uses a false weight and thus gains a 23% profit. How many grams of almonds is he giving for 3.075 kg?
1. 2600 2. 2500 3. 2400 4. 2700

Q158 A shopkeeper is incurring a loss of cost price of 4 pens while selling 20 pens to Ajay. If the shopkeeper had purchased 20 pens at 10% less price and had sold 20 pens to Ajay at 25% more than the selling price, then how much percentage would he have gained (rounded off to 1 decimal place)?
1. 8.0 2. 10.0 3. 12.5 4. 11.1

Q159 A dealer sells rice at a profit of 15% and uses a weight that is 15% less than the actual weight. Find his percentage gain.
1. 37.5% 2. 26% 3. 35.3% 4. 53.3%

Q160. Muskan buys two kg of pulses for Rs 400 and sells it for Rs 440. She also uses the weight of 850 gm instead of 1 kg. What is Muskan's actual profit percentage?
1. 30% 2. $25\frac{15}{17}\%$ 3. $29\frac{7}{17}\%$ 4. 27%

Q161 In a grocery shop, Samarth sold 950 g of sugar to a customer in place of 1 kg for Rs 54. The cost price of 1 kg sugar was Rs 36. How much profit (in Rs) did he earn on selling the sugar?
1. 19.8 2. 16.2 3. 20.2 4. 18.7

CGL PRE 23

Q162 An electronic store owner allows two successive discounts of 20% and 25% on each item. The store has a reward points scheme which enables a customer to get free shopping worth Rs 0.10 on every 1 reward point credited to the customer's account on previous purchases from the store. A customer decides to buy a laptop that is marked Rs 72,000. What will be its net selling price if he has 2850 reward points to his credit?
1) Rs 43,200 2) Rs 42,915
3) Rs 42,215 4) Rs 42,942

Q163 A shopkeeper sells an article at 15% profit and uses a weight which is 20% less. Find his actual profit percentage.
1. 43.75% 2. 42.5% 3. 40% 4. 50%

Q164 Ram sells a suitcase to Mohan at a profit of 20%. Mohan sells it to Shyam at 40% profit. If Shyam paid ₹1,430 for it, Ram bought it for _____.
1. Rs 875 2. Rs 870 3. Rs 851.19 4. Rs 880

Q165 A and B invested money in a business in the ratio of 7 : 5. If 15% of the total profit goes for charity, and A's share in the profit is Rs 5950, then what is the total profit?
1. Rs 12,500 2. Rs 12,000
3. Rs 10,500 4. Rs 11,750

Q166 R lends some money to S on which S pays Rs 17,000 more to R. S lends the same money to T, on which T pays 8.5% more to S. What should be the minimum amount (in Rs) that S must borrow so that he does not incur any loss in the process?
1. 2,00,000 2. 2,25,000
3. 1,80,000 4. 1,70,000

Q167 The cost price and selling price of rice are the same. Due to a faulty weighing machine, the seller earns a 15% profit. If Rs x is the cost

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which shows 1000 gm instead of 950 gm, what should be the selling price (in Rs) now to get the same percentage of profit?
1. 1.0295x 2. 1.0259x
3. 1.0925x 4. 1.0950x

Q168. A dishonest shopkeeper sells mangoes at Rs 30/kg bought at Rs 20/kg and he is giving 800 g instead of 1 kg. The shopkeeper's actual profit percentage is :
1. 75% 2. 37.5% 3. 50% 4. 87.5%

Q169. A shopkeeper bought certain number of apples for Rs 3600. He sold one-fifth of them at a loss of 10%, one-fourth of the remaining apples at a loss of 5%, and two-third of the rest at a profit of 15%. At what price(in Rs) should he sell the remaining apples to earn a profit of 27% overall?
1. 1548 2. 1584 3. 1845 4. 1864

Q170. The marked price of an article is 40% above its cost price. If its selling price is $73\frac{1}{2}\%$ of the marked price, then the percentage profit is:
1. 2.9% 2. 2.7% 3. 2.6% 4. 2.5%

Q171. R's weighing machine shows 400 gm when the actual weight is 350 gm. The cost price of almonds is Rs 880 per kg and packets of 200 gm are made using the faulty machine. What should be the selling price (in Rs) of each packet to get a profit of 25%?
1. 197.50 2. 175.50
3. 182.50 4. 192.50

CHSL PRE 23

Q172. A shopkeeper does a faulty weighing of an item of 930 gram instead of 1 kg and sells it at its cost price. Find his profit percentage on selling 15 kg of the item.
1. $\frac{49}{93}\%$ 2. $6\frac{19}{93}\%$ 3. $8\frac{79}{93}\%$ 4. $5\frac{21}{93}\%$

Q173. Ranjeet buys 1 kg potato for Rs 20 and sells it for Rs 25. He also uses a weight of 800 gm in place of 1 kg. What is Ranjeet's actual profit percentage on the sale of 1 kg potato?
1. 57.25% 2. 56.25% 3. 55.75% 4. 56.75%

Q174. Arun brought 50 kg of rice at a discount of 15% on the marked price. For purchasing bulk quantity, he was given 5 kg of wheat (the marked price of which was 60% the marked price of rice) free of cost. Had the retailed sold both items at their marked price to his other customers, then approximately what would be the profit percentage that the shopkeeper could earn?
1. 25.2% 2. 24.7% 3. 22.8% 4. 23.5%

Q175. The marked price of 85 items was equal to be cost price of 153 items. The selling price of 104 items was equal to the marked price of 65 items. Calculate the percentage profit or loss from the sale of each item.
1. 12.25% profit 2. 12.5% loss
3. 15% profit 4. 12.5% profit

Q176. A shopkeeper professes to sell sugar costing Rs 40/kg at Rs 42/kg but gives only 550 grams sugar in place of 600 grams using faulty weighing machine. His profit percentage (correct to 2 decimal places) is:
1. 16.45% 2. 15.45% 3. 14.54% 4. 15.54%

Q177. Sukhen purchased some perishable items for sale but 15% of those items could not be sold and went bad. However, Sukhen managed to sell the rest of the items at a price that helped him earn an overall profit of 19%. At what percentage above the cost price of each item did Sukhen sell each of the items that did NOT go bad?
1. 42% 2. 36% 3. 34% 4. 40%

Q178. In what ratio, wheat at Rs 23 per kg should be mixed with wheat at Rs 14 per kg so that on selling the mixture at Rs 20 per kg there is a profit of 25%?
1. 2 : 3 2. 5 : 7 3. 2 : 7 4. 3 : 5

Q179. A person sold two items selling each for Rs 42,600. On the first item, he made a loss of 25% while on the second, he gained 20%. Find his overall percentage gain or loss, giving your answer correct to one place of decimal.
1. 8.3% loss 2. 7.7% gain
3. 7.7% loss 4. 8.2% loss

CGL MAINS 23

Q180. B purchased 15 kg apples at the rate of ₹180 per kg from a wholesaler who uses a weight of 950 grams for the kg weight. B sold all these apples at ₹180 per kg but used a weight of 750 grams for the kg weight. Find the percentage profit earned by B in the transaction (correct to 2 places of decimal).

(a) 25.75% (b) 22.55% (c) 33.33% (d) 26.67%

SELECTION PHASE XII

Q181. A shopkeeper normally makes a profit of 20% in a certain transaction; he weighed 900 gm instead of 1 kg due to an error in the weighing machine. If he charges 15% less than what he normally charges, then what is his actual profit or loss percentage?
a) 18.33% profit b) 13.33% profit
c) 13.33% loss d) 18.00% loss

Q182. A vendor buys 20 pens for ₹15 and sells them at 15 for ₹20. How many pens should be bought and sold to earn a profit of ₹245?
a) 280 b) 540 c) 320 d) 420

Q183. The selling price of y items is equal to the cost price of 540 items. If the profit made is 44%, then find the value of y.
a) 375 b) 400 c) 360 d) 380

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Q184. During the lockdown, a state government gives 4.5 kg of rice to each person of a family at a cost price of ₹40 per kg. But the distributor uses false weight of 3.75 kg instead of 4.5 kg and distributes the rice. The accumulated rice was sold in the black market at double the price. He showed the government that he distributed 2700 kg of rice. When caught, he was made to pay a fine of 125% of what he earned in the black market. What was his fine amount?

a) ₹36,000 b) ₹45,000
c) ₹28,00 d) ₹54,000

Q185. Reyan purchased a laptop for₹56,000 and a scanner-cum-printer for₹22,000. He sold the laptop for a 20% profit and the scanner-cum-printer for a 15% profit. What is his profit percentage?

a) $18\frac{21}{37}$ b) $18\frac{23}{39}$ c) $12\frac{23}{39}$ d) $12\frac{21}{37}$

Q186. A shopkeeper expects a gain of 36% on his cost price. If in a month, his sale was ₹6,14,856, then what was his profit (in ₹)?

a) 1,62,756 b) 1,63,900
c) 1,61,235 d) 1,62,800

Q187. To clear a stock of items, a seller gives an 8% discount on the marked price. He spends ₹x on the promotion of the discount offer. His total cost of the items is ₹2,50,000 and the marked price is 10% more than the cost price. Finally, he earns no profit or no loss. What is the value of x?

a) 7500 b) 3000 c) 6000 d) 4500

Q188. A shopkeeper claims to sell 450 kg rice at a cost price of ₹40 per kg but uses a weight of 900 grams instead of a one kilogram weight. He makes a profit of ₹2,520 by selling the remaining rice in the black market. The ratio of the black-market price to the original price per kg of rice is:

a) 9 : 4 b) 4 : 3 c) 10 : 7 d) 7 : 5

CPO 2024

Q189. Ramanna purchased raw materials for a certain price to manufacture a product. However, owing to shortage of labour, 22.5% of the raw materials could not be utilised and got wasted. 80% of the cost of raw materials used was added as the cost of manufacturing. If Ramanna could sell his product at a price to earn an overall profit of 20% after offering a discount of 20%, how many times of the total cost of the raw materials purchased was the marked price of the product?

a) 2.44 times b) 2.42 times
c) 2.43 times d) 2.40 times

Q190. The cost price of 36 articles is the same as the selling price of N articles. If the profit is 20%, then the value of N is:

a) 25 b) 43 c) 40 d) 30

Q192. A shopkeeper sold 3 wristwatches for ₹2,800 each. If he has sold the watches with 40%, 25% and 12% profit, respectively, then find his overall profit percentage (correct to 2 decimal places).

a) 0.2419 b) 0.2463 c) 0.2455 d) 0.2475

Q193. A dishonest dealer claims to sell his products at 24% loss on the cost price but uses 100 g weight instead of 200 g weight. His profit percentage is:

a) 52% b) 40% c) 48% d) 55%

Q194. A reduction of 7.5% in the cost price of a commodity enables a shopkeeper to purchase 15 kg more than what he previously purchased for a sum of ₹7,400. In order to make a profit of 32.5% on the pre-reduction cost price of the commodity, at what price (in ₹) per kg should the commodity be sold?

a) 54 b) 53 c) 52 d) 51

Q195. A shopkeeper gives a discount of 12% on the purchase of 10 kg of sugar. The cost price of the sugar is ₹30/kg, and the marked price is ₹38/kg. The weighing machine of the shopkeeper is faulty, and it shows weight of 1 kg when the actual weight is 900 grams. Find the percentage profit of the shop keeper (rounded off to two decimal places).

a) 30.18% b) 12.5% c) 22.25% d) 23.85%

Q196. A vegetable vendor bought 100 kg of potatoes at the rate of ₹19 per kg and spent ₹100 as cartage. He sold 60 kg of potatoes with a 50% profit and half of the remaining stock with a 40% profit. He sold half of the still remaining potatoes with a 25% profit. What profit percentage should he aim for when selling the ultimate remaining potatoes to achieve an overall profit of 42%?

a) 0.16 b) 0.1 c) 0.12 d) 0.15

Q197. The cost price of two articles is equal. One article is sold at a profit of 12% and the other article for Rs 3600 more than the first. If the net profit is $15\frac{27}{51}\%$, then what is the cost price of each article?

a) Rs 50,000 b) Rs 51,000
c) Rs50,900 d) Rs52,150

CHSL 2024

Q198. A shopkeeper cheats 25% in weight while buying rice and cheats 25% while selling it. If he sells the rice at 12½% profit, then find his net profit percentage.

a) 82.5% b) 62.5% c) 87.5% d) 92.5%

Q199. A shopkeeper sold an article at a 26% profit. On selling it for ₹2,250 more, he would get a profit of 41%. If this article is sold at 12% profit, then the selling price would be:

a) ₹16,800 b) ₹15,000
c) ₹15,800 d) ₹16,120

Q200. Ravi sells his goods at a 25% loss on cost price but uses 45% less weight. What his percentage profit or loss?

a) profit, $47\frac{9}{10}\%$ b) Loss, $36\frac{4}{11}\%$
c) Loss, $47\frac{9}{10}\%$ d) Profit, $36\frac{4}{11}\%$

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Q201. Amit and Bilal buy goods for Rs 1,500 and Rs 2,000, respectively. Amit marks his goods up by y% while Bilal marks his goods up 2y% and offers a discount of y%. If both make the same profit, then find the value of y?

a) 10.5 b) 12 c) 11.5 d) 12.5

Q202. A shopkeeper sold 5/8 of his articles at a gain of 20% and the remaining at the cost price. What is his gain percentage in the whole transaction?

a) $16\frac{1}{2}\%$ b) $14\frac{1}{2}\%$ c) $13\frac{1}{2}\%$ d) $12\frac{1}{2}\%$

Q203. Find the gain percentage, given that Siddhi sold her scooter for Rs 71785 gaining 1/5th of the selling price.

a) 20% b) 25% c) 10% d) 15%

Q204. A shopkeeper has fault of 100 g in a 3 kg weight. He sold 1 kg of potatoes to charu using the same faulty weight for ₹ 46. The cost price of the potatoes for the seller was ₹12 per kg. How much profit (in ₹) did he earn on the potatoes?

a) 10.2 b) 10 c) 11.6 d) 11.2

Q205. If books bought at prices ranging from ₹200 to ₹260 are sold at prices ranging form ₹250 to 300. What is the greatest possible profit that might be made in selling 25 books?

a) ₹2,300 b) ₹1,800 c) ₹2,700 d) ₹2,500

Q206. If a shopkeeper sells sugar at ₹44.8 per kg, he is able to make a 12% profit. Due to water seepage, 1/5th of the sugar is damaged. What should now be the selling price per kg of the rest of the sugar to have a 5% profit?

a) ₹52.5 b) ₹49.5 c) ₹51.5 d) ₹48.5

Q207. An article passing through two hands is sold at a total profit of 40% of the original cost price. If the first dealer makes a profit of 30%, then the profit percentage made by the second dealer is:

a) $8\frac{6}{13}\%$ b) $6\frac{1}{13}\%$ c) $7\frac{1}{13}\%$ d) $7\frac{9}{13}\%$

ANSWERS

1	A	2	C	3	D
4	B	5	D	6	C
7	D	8	C &d	9	C
10	A	11	C	12	A
13	C	14	C	15	A
16	C	17	A	18	A
19	B	20	D	21	D
22	B	23	A	24	B
25	B	26	C	27	C
28	D , c	29	C	30	C
31	A	32	A	33	B
34	A	35	D	36	D
37	C	38	C	39	B
40	B	41	A	42	D
43	D	44	A	45	A
46	D	47	A	48	B & c
49	B	50	B	51	B
52	A	53	C	54	C
55	D	56	A	57	B
58	A	59	B	60	C
61	C	62	B	63	C
64	D	65	C	66	D
67	C	68	A	69	A
70	D	71	A	72	B
73	A	74	C	75	A
76	C	77	D	78	C
79	A	80	C	81	A
82	A	83	B	84	B
85	D	86	D	87	A
88	D	89	A	90	C
91	B	92	A	93	C
94	B	95	C	96	B
97	C	98	B	99	B
100	B	101	D	102	C
103	C	104	A	105	C
106	C	107	D	108	A
109	D	110	C	111	D
112	C	113	A	114	B
115	D	116	A	117	A
118	A	119	B	120	B
121	A	122	D	123	B
124	C	125	D	126	A
127	A	128	B	129	A
130	B	131	B	132	A
133	D	134	C	135	B
136	B	137	C	138	B
139	A	140	D	141	D
142	D	143	B	144	C
145	B	146	C	147	A
148	C	149	C	150	A
151	A	152	B	153	D
154	A	155	B	156	A
157	B	158	D	159	C
160	C	161	A	162	B
163	A	164	C	165	B
166	A	167	C	168	D
169	B	170	A	171	D
172	A	173	B	174	B
175	D	176	C	177	D
178	C	179	C	180	D
181	B	182	D	183	A
184	B	185	B	186	A
187	B	188	D	189	C
190	D	191		192	B
193	A	194	B	195	D
196	D	197	B	198	C
199	A	200	D	201	D
202	D	203	B	204	D
205	D	206	A	207	D

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1.

(4% Loss)
24 → 288
25 → 300 (CP)
300 → 315
5% ↑ $\boxed{\text{option A}}$

2.

-25% & +40%
4 : 3
5 : 7
20 : 21 5% ↑ $\boxed{\text{option C}}$

3.

25% Profit
4 : 5
1 → 44.80
4 → 179.20
$\boxed{\text{option D}}$

4.

100 114] ×86
100 86] ×114
8600 + 11400 → 624
diff = 2800 → $\frac{624}{20000} \times 2800$
= 87.36

5.

5) 9 [11 → 100 ₹
11 9 → 100 ₹]
overall CP 99+99 → 2000
SP 19.8 [10 → 100]
2000 1980
1% Loss $\boxed{\text{option D}}$

6.

$\frac{2500}{25} \times \frac{10}{9} = \frac{2400}{N} \times \frac{5}{6}$

$\boxed{N = 18}$ option C

7.

7) 100 $\xrightarrow{\times 12\uparrow}$ 112) 0.24
-12% ↓ 88 $\xrightarrow{\times 27\uparrow}$ 111.76
0.24 → 9
100 → 3750 $\boxed{\text{option D}}$

8.

25 : 27
10 : 9] ×3
27 → 9720
55 : 54
-1 → 360
$\boxed{\text{option C}}$

8.

Method : 1 →
CP SP
2400 → 3000
25% ↑
30 = 2.5 dozen waste
40 − 2.5 = 37.5
So $\frac{3000}{37.5} = 80$

Method : 2
40×12 = 480) 30 waste
rem = 450
$\frac{2400}{5} \times \frac{6}{450} \times 12 = 80$

9.

net discount
$\frac{3\times0 - 1\times40}{4} = -10\%$
25% ↑ & −10 ↓
4 5
10 9
8 : 9 12.5% Profit
$\boxed{\text{option C}}$

10.

treat 38kg ~ 40kg
now
40 : 45 : 55
8 : 9 : 11
54.50 62 48
436 + 558 + 528 = 65×28 (8+9+11)
1522 : 1820
~ 19.6% (approx)

11.

3+4+7 → 110166
4 → 31476) 0.70
2203.20
$\boxed{\text{option – C}}$

12.

100 → 106 $\xrightarrow{\times 1.08}$ 114.48 $\xrightarrow{\times 1.1}$ 125.98
125.98 ~ 126
$\frac{31482}{126} \times 100$ ~ 25K
$\boxed{\text{option – A}}$

13.

) 516 × 12 − 3×129
15% = 5805
100% → 38700
(15 Cycle)
1 cycle → $\frac{38700}{15}$ = 2580

14.

26 → 6500 (SP)
25 → 6250 (CP)
4 −4
x
6250 : 3750
5 : 3
$\frac{20-12}{5+3} = x$
$\boxed{1\% \uparrow = x}$

Method – 2
6500 6250
(SP) +4% 3750 × $\frac{4}{25}$ = −15
$\frac{250 - 150}{6250 + 3750}$
$= \frac{100}{10000} \times 100 = 1\%$

15.

23 → 1495) +195
20 → 1300
+10% +130
$\boxed{325}$

16.

CP SP
5 3×4 ×1/3
×5/4 4
5 12
140% ↑

17.

17) 100 125
(CP) (M)
$\frac{7}{20} \times 0 - \frac{2}{5} \times 15 - \frac{1}{4} \times 20$
= −11% (Net discount)
25% 11 25×11 = 11.25

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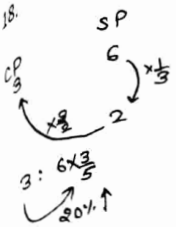
18.



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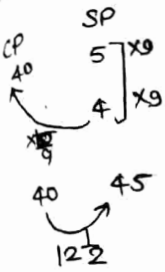

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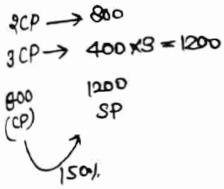

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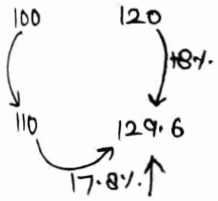


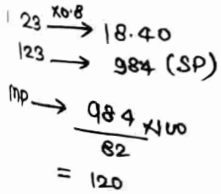
22.

$$\frac{7}{20}\times 65 - \frac{13x}{20} = 12$$

$$455 + 240 = 13x$$

$$53.5 = x$$

23.



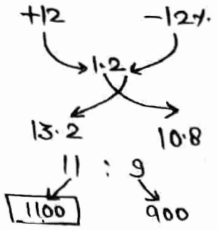
24.

$$-10x + 2x = 20\times 3$$

$$-8x = 70$$

$$\boxed{x = 35}$$

25.



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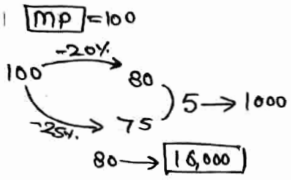


27.

SP = 5
earn = 1
CP = 4 → 4800

$$\text{earned} = \frac{4800}{4} = 1200$$

CurrentMUDDE

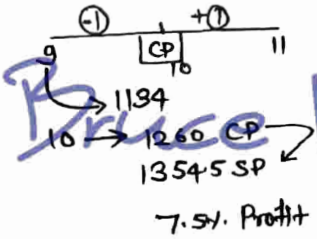
28.

$$100\times P = 40\times CP$$

$$\frac{P}{CP} = \frac{100}{40}$$

Profit % = 40%

28.



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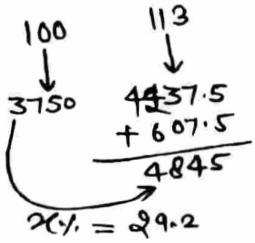

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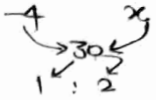
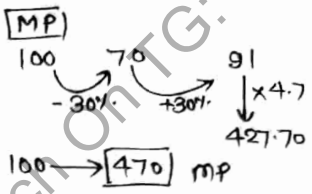


$$-4 + 2x = 90$$

$$x = 47\%$$

SP = 14700

31.



32.

Tables + Chairs

10% + 10% + 10%

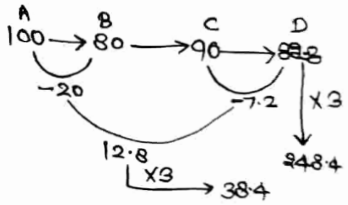
$$2080 - 15400\times\frac{1}{10}$$

10% of SC = 540

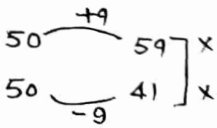
SC = 5400

$$\boxed{3C = 1800}$$

33.



34.



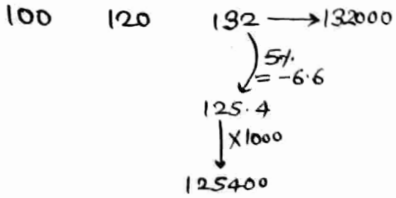
$$9\times 41 - 9\times 59 = -9\times 18 \text{ (net)}$$

59×41 (SP) → 30

$$\text{net Profit} = \frac{30\times(-9\times 18)}{59\times 41}$$

$$= 2\text{ ₹ loss}$$

35.



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36.

36) Let total Art $= x$

$12x - 9x \rightarrow 150$

$x = 50$

CP of $x = \frac{250}{50} = 5$

$21 \times 5 \times \frac{6}{5} = 126$

37.

37) $25 \rightarrow 500$

$28 \rightarrow 560$ [CP]

$\xrightarrow{20\%} 672$ (SP)

MP SP

$\boxed{800}$ 672

$\times \frac{25}{21}$

38.

38) Let CP = 1

total CP = 40₹

(30%) $13 \rightarrow 26$

$10 \rightarrow 20$ [CP]

rem $20 \rightarrow 18\%$ Profit

overall $\rightarrow \frac{30+18}{2}$ [∵ CP of 1:1 हो]

$= 24\%$

39.

$-5x$ $+6x$

108 CP 123.40

$11x \rightarrow 123.40 - 108$

$x = 1.4$

CP $= 108 + 5 \times 1.4 = 115$

115 120.75

5 ↑ Profit

40.

$-16\frac{2}{3}\% = -\frac{1}{6}$

6 5 — (I)

x 5 — (II)

$6+x$ 10 [No Profit No loss]

$x = 4$

4 : 5 25% ↑

41.

$6CP = 38CP - 2240$

$32CP = 2240$

$CP = 70$

42.

$$\frac{100(19-11) - 2 \times 19 \times 11}{200 + (19-11)}$$

1.8%

43.

100 130 117

%30+ −10%

MP SP (new

130 117+6.5

−5% discount

44.

$-5x$ $+6x$

216 CP 246.80

$11x \rightarrow 246.80 - 216$

$x = 2.8$

$216 + 2.8 \times 5 = 14 + 216$

$= 230$ [CP]

230 220.75

Profit ~ 4%

45.

45) CP MP SP

25 $\xrightarrow{-16\%}$ 21

$\xrightarrow{-8\%}$ 23 (new SP)

21 is on 8% Profit

(CP) $25 \rightarrow \frac{21}{27} \times 25$

CP new SP

$\frac{21}{27} \times 25$ 23

Profit 18.29

46.

loss on SP of 15%

CP SP

23 $20 \rightarrow 640$

$\underbrace{\frac{640}{20} \times 23}_{CP} \times \underbrace{\frac{23}{20}}_{15\% \text{ Profit}} = 846.4$

47.

Method : 1

4 : 5

$4 - 4 \times \frac{5x\%}{3} = 5 - 5x\%$

$1 = \frac{35x}{300} \rightarrow x = \frac{60}{7}$

Method : 2

$\frac{4}{5} = \frac{100 - x}{100 + \frac{5x}{3}}$

$1200 - 1500 = -15x - 20x$

$x = 60/7$

48.

MP = 240

100% → 240

82% → 196.8 (SP)

CP SP

160 196.8

100% 123%

या

$\frac{240}{100} \times \frac{82}{123} \times 100$

$= 160$

49.

49) MP SP

100 70 $\frac{100 \times 95}{100}$

+25

×4 25 Profit → 65

100 (SP) → 260 ×4

49) Check by option

7 Unit → 105 [Checking options]

5U → 75

now 75 + 75% Profit on 75

75

+56.25

131.25 (satisfied)

50.

CP MP SP

100 127 106.28

$x = 16$

51.

50 (CP₁) 60 (SP₁)

60 (CP₁) 54

90%

50+60 114

$3\frac{7}{11}\%$ Profit

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52.

52) M-1
T=5) 1 $4\times\frac{2}{5}$ $4\times\frac{3}{5}$
$=1.6$ $=2.4$
-100% $+15\%$ $+10\%$

overall $= \frac{-100+24+24}{5}$
$= -\frac{52}{5} = 10.4\%\downarrow$

M-2
$\frac{1}{5}\times(-100\%) + \frac{4}{5}\times\frac{2}{5}\times 15$
$+\frac{4}{5}\times\frac{3}{5}\times 10\%$
$-20\% + 4.8\% + 4.8\%$
$= -10.4\%\downarrow$

M-3 Let Total = 25
1 : 4
15 10
x
2 : 3
$x = 12\%\uparrow$
$\frac{12\times4+1(-100)}{5}$ → rotten
$= -10.4\downarrow$

53.

53) (F) 20 23] ×19
(W) 25 19] ×23
SP 23×19 → 57300
1 → 60
25×23 → 34500

54.

Total ARTICEL — 100
$40(-15)+20(20)+40x = 10\times100$
$x = 30\%$

55.

CP MP SP
[5 4] 29
$\frac{4\times29}{29}\times30 = 120 : 145$
≈ 21

56.

CP
−22% +22%
78 → 1170
100 → 1500 (CP) : 1450 (SP)
Loss of 33%

57.

MP SP₁ SP₂
20 17
10 9
200 153 $\frac{153}{4}\times2.4$
↓2.4 ×1/4
480 $= 91.80$

58.

100 70 112
−30% +60%
+12% Gain

59.

76 100 118
Diff = 42 → 1596
100 → 3800

60.

2100 : 3150
या 200 : 300
200 + 2k = 300 − 3k
[same SP]
5k = 100
K = 20

61.

CP SP
3 6 (Let)
$\times\frac{2}{3}$ $\times\frac{2}{3}$
2
3 $\frac{6\times2}{5}$
20% Loss

62.

900 1125 1500 1350
%25 −10%
10 9
1125 : 1500
≈ 33%

63.

$\frac{632500}{23}\times20 : 810000$
(CP) : (SP)
≈ 47.3%

64.

64) 100 125
Total goods = 100
$-(25\times0+60\times25+15\times10)$
1650 = −16.50 discount

65.

$\frac{CP}{MP} = \frac{100-25}{100-15}$
$CP = \frac{1360\times75}{85}$
$= 1200$

66.

10SP = 36SP − 36CP
26SP = 1040
SP = 40
5 SP = 200

67.

Same SP :-
$\frac{100(40-40)-2\times40\times40}{200+(40-40)}$
= 16% loss

68.

−x x
6341 8579
2x = 2238, x = 1119
$\frac{1119\times100}{6341+1119} = 15\%$

69.

$95\times\frac{9}{2} = (95-7)\times\frac{78}{12}$
CP SP
34%

70.

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100% → 3750
76 → 2850
Still gain 14%.
50 → 2500
57 → 2850

71.

12SP = 92SP − 92CP
92CP = 80SP
$\frac{CP}{SP} = \frac{20}{23}$ ↗ 15% ↑

72.

$\frac{100(24-24) - 2\times24\times24}{200+(24-24)}$

$= -\frac{2\times576}{200}$

$= -5.76\%$ ↓

73.

5 | 12 → 222
6 | 10 → 225
120 → 2460 ↓ 20% ↑
$\frac{120}{8}$ → $\frac{2952}{8}$ (SP)
SP of 15 → 369

74.

10 11] ×9
10 9] ×11
200 198 → 1980×2
1 → 20
−2 → 40₹ loss

75.

30×12
$+ \left(\frac{70\times40}{100}\right)\times25 \Rightarrow 3000$
$+ 42x$
$\Rightarrow 42x = 1940$
$x = 46.2\%$

76.

76) CP 25 SP 12×3 $\frac{7}{12}$ 7×3
loss of 16%
now
25 : $12\times3\times\frac{9}{10}$
29.6%

77.

D15 = $250\times\frac{1}{4}$
= 62.5
$\frac{875}{62.5} = 14$

78.

78) 400×1.50 = 600
next
$400\times1.50\times\frac{94.5}{100} = 567$
Total ₹ = 600+567
= 1167

79.

79) 4600+500
= 5100 ↗ 8% 5508(MP) ↓ x% 4681.80(SP)
$x\% = \frac{5508-4681.80}{5508}\times100$
= 15

80.

15% & 20% of 15
↳ 15% & 3%
20 17
100 97
2000 1649
↓ 5320 ↓ 4386

81.

81) 100 → 76
100 → x
200 → 224
12% ↑
(SP) x = 224−76
= 148
148−76 = 72 → 270
148 → 555

82.

40×(−12) = −480
20×(25) = 500
40(x) = 40x
10×100 = 1000
40x = 980
x = 24.5%

83.

83) 100 150 120(SP)
−20%
80 150 100.8
+26%
150 100.8
−32.8% discount

84.

−5x +6x
216 CP 246.80
11x → 30.8
5x → 2.8×5 = 14
CP = 216+14 = 230
SP ⟹ 320.75
Profit of 39.5%

85.

CP of 1 article = $\frac{1200}{16}$ = 75
CP of 1 " = $\frac{960}{16}$ = 60
CP of 2 " = 135
SP of 1 " = $\frac{1350}{15}$ = 90
SP of 2 " = 180
P% = $\frac{45}{135}\times100$ = 33.3%

86.

86) 100 → 131
−13%
$\frac{131\times87}{100}$
100×100 : 130×187
[131≈130]
1000 : 113.1
13.1% से थोड़ा सा ज्यादा वाला option
13.97%

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87.

CP MP SP

[25 16]×34

16×25 → 4000, 1 → $\frac{21}{2}$

MP $(25\times34)\times\frac{21}{2}$

= 8925

88.

$\frac{100(24-20)-2\times24\times20}{200+24-20}$

$= \frac{400-960}{204}$

= 2.75%

89.

100 120

$\frac{40(0)-60\times30}{100}$

= −18

$20-18-\frac{20\times18}{100}$

= 1.6% loss

90.

CP SP

10 11

9

10 : $11\times\frac{23}{25}$

250 : 253

$1\frac{1}{5}$%

91.

91) 100 120

5 → 120

4 → 96 (new CP)

100−96 → 50

100 → 1250

92.

1000 712.89

x% successive 10%

9 → 712.89

10 → 79.21×10

1000 792.1

Check by option

11% $\xrightarrow{\text{succ}}$ 20.69%

93.

100 82 30

112

30 → 960

100 → 3200

3840 20%↑

94.

20% Profit

5 : 6

1 → 3080

6 → 18,480

95.

95) CP SP

60 : 90

%25

7.5 10

$33\frac{1}{3}$%

96.

150000 : 450000

1 : 3

4 → 160000

1 → 40000

Salary = 70000−40000

= 30000

97.

[20% −10

overall

35 5]

7 : 1

$\frac{140-10}{7+1}$ = overall

98.

Table chair

[10% 6%

overall

4600 1800]

23 : 9

$\frac{230+54}{32}$ = overall

$8\frac{7}{8}$

99.

99) $CP_1 = 40 \rightarrow 44$ 16

$CP_2 = 50 \rightarrow 60$ ×30

480

$\left[(40+50)\times\frac{9}{10}\right]\times30 = 810$

100.

Profit 8.4%

SP = 108.4 → 59620

100 → 55000

101.

125R + 110T = 30400 — (1)

110R + 125T = 30700 — (2)

15R − 15T = −300

[या R−T = $\frac{-300}{15}$

R−T ⇒ −20] — (3)

(1) + 110×(3)

235R = 30400 − 2200

$\boxed{R = 12000}$

102.

12 100.8 100/12

15 117 200/15

100 840

200 1560

300 $\boxed{2400}$ (CP)

20 204 $\frac{270}{20}$

या 270 $\boxed{2754}$ SP

14.75%

103.

103) Per kg Price Loss/Profit

$+\frac{450}{25}$ $-\frac{275}{25}$

= 18 −11

diff 18−(−11) = 29

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104.

Let Apple $= x$

SP diff $12x - 9x$

$= 3x \rightarrow 870$

$x = 290$

CP of 1 Apple

$\frac{2320}{290} = 8$ 25%↑ 10 (SP)

105.

600

480 100 20

या ① 24 ② 5 ③ 1

① $\frac{600}{480} = \frac{5}{4}$ या 25%↑

② 125% + 10% of 125%

$= 137.5\%$

or 37.5% Profit

③ $1 \times 0 = 0$

$\frac{24 \times 25 + 5 \times 37.5 + 1 \times 0}{30}$

$= \frac{787.5}{30} = 26.25\%$

106.

3

2 1

x -10

$2x - 10 = 3 \times 25\%$

$x = 42.5\%$

107.

CP SP

3 6 (Let)

$33\frac{1}{3}\%$

$\times\frac{3}{2}$ 2

$3 : 6 \times \frac{4}{5}$

60%

108.

$\frac{CP}{MP} = \frac{100 - 12\frac{1}{2}}{100 + 15}$

$\frac{385}{MP} = \frac{87.5}{115}$

$MP \cong 506$

$SP = \frac{385 \times 23}{20}$

$= 442.75$

$MP + SP = 948.75$

109.

$CP \xrightarrow{3x} 960$

$CP \xrightarrow{-x} 800$

$800 + x = 960 - 3x$

$x = 40$

$CP = 840$

$\frac{3 \times 40}{840} \times 100 = \frac{100}{7}\%$

110.

$x \times 100 \quad \frac{\times 138}{100} \times \frac{72}{100} = 9936$

$100x = 10000$ Ans

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111.

CP	SP
15	20
850	1000
51 :	80

$P\% = \frac{29}{51} \times 100$

$= 56.86\%$

112.

$\boxed{\frac{CP}{MP} = \frac{100 - D\%}{100 + P/L}}$

$\frac{5800}{MP} = \frac{88}{110}$

$MP = 7250$

113.

SP of T.F $= 840$

CP " " $= \frac{840 \times 100}{120}$

$= 700$

SP of W.C $= 1008$

$CP = \frac{1008}{112} \times 100$

$= 900$

Total CP $= 1600$

$1600 - 980$

$= 620$

114.

Profit

$3 + 3 + \frac{22 \times 50}{1000} + \frac{22 \times x}{1000} = 7.76$

$6 + \frac{11}{10} + \frac{11x}{500} = 7.76$

$x = 30$

$1000 - 30 = 970$ g.

115.

CP	SP
18	22
850	1000
153 :	220

$P\% = \frac{67}{153} \times 100 = 43.79\%$

116.

a — b

1 — $\frac{b}{a}$ CP

b — a

1 — $\frac{a}{b}$ SP

$P\% = \frac{\left(\frac{a}{b} - \frac{b}{a}\right) \times 100}{b/a}$

$= \frac{(a^2 - b^2)}{b^2} \times 100$

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117.

$CP = P\%$

$P \times \left(\frac{100 + P}{100}\right) = 96$

$P^2 + 100P - 9600 = 0$

$P = 60$

Better option method

118.

$100 \Rightarrow \frac{126 \times 88}{100}$

$= 110.88$

$= 10.88$

119. $\frac{2000 \times 100}{125} = x$

$x = 1600g$

faulty kl = 2000 - 1600

$= 400g$

119.

$\frac{2000 \times 100}{125} = x$

$x = 1600g$

faulty kl = 2000 - 1600

$= 400g$

120.

$D\% = \frac{1}{5} \times 100 = 20\%$

$CP = 5 \times 1200 = 6000$

$SP = 4 \times 1800 = 7200$

$P\% = \frac{1200}{6000} \times 100$

$= 20\%$

121.

Retail.P / 100 — C / 20 — CP / $\frac{80 \times 100}{105}$

100 — 10 — =

$P\% = \frac{90 - \frac{80 \times 100}{105} \times 100}{\frac{80 \times 100}{105}}$

$= \frac{(90 \times 21 - 80 \times 20) \times 100}{80 \times 20}$

$= \frac{290}{1600} \times 100 = 18.1\%$

122.

$CP = P\% = x$

$x\left(1 + \frac{x}{100}\right) = 1200$

$x(100 + x) = 120000$

$300(100 + 300) = 120000$

$x = 300$

123.

CP	SP
100	89
78	100

$78 : 89$

$P\% = \frac{11 \times 100}{78}$

$= 14.1\%$

124.

Price of max in HY = 100m

" " " madras = 75m

$CP = 75m + 1000$

$SP = 100m$

$P\% = 10\%$

$(75m + 1000) \frac{\times 11}{10} = 100m$

$825m + 11000 = 1000m$

$175m = 11000$

$100m = \frac{11000 \times 100}{175}$

$= 6285.7$

125.

$A : B = 9 : 5$

$\frac{29840}{9} \times 14 \times \frac{10}{9}$

$= 51575.3$

126.

$\frac{100 \times 93}{124 \times 100}$

$= 0.75m$

$= 75cm$

127.

20% — 18% : 2

12% : 3 : 1

$\frac{2220}{4} \times 1 = 555$

128.

CP	SP
100	112
88	100

$22 : 28$

$11 : 14$

$= \frac{3}{11} \times 100$

$= 27.27\%$

129.

$100 \longrightarrow 165$

$100 \xrightarrow{20\%} 120 \xrightarrow{25\%} 150 \text{ —— } 165$

$\frac{15 \times 100}{150}$

$= 10\%$

130.

CP	SP
1000	1300
100	115

$200 : 299$

$P\% = \frac{99}{200} \times 100 = 49.5\%$

131.

Let money = 200

$12\frac{1}{2}\%$ — Rem 175

$\frac{175 \times 25}{100} = 630$

$1 \text{ —— } \frac{630 \times 100}{175 \times 25}$

$200 \rightarrow \frac{630 \times 4}{175} \times 200$

$= 2880$

132.

$100 \xrightarrow{-10\%} 90$

$= \frac{90 \times 100}{108}$

$= 83.33$

≈ 83

133.

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CP	SP
40	36
800	1000

$40 \times 800 : 36 \times 1000$

$8 : 9$

$P\% = \frac{1}{8} \times 100$

$= 12.5\%$

134.

$24.5\% = 1274$

$100\% = \frac{1274 \times 100}{24.5}$

$= 5200$

135.

Table = 100x

Chair = 100y

$100x + 100y = 3900$

$8x + 16y = 540 \times 12.5$

$-100y = -2850$

$100y = 2850$

$100x = 1050$

$2850 - 1050$

$= 1800$

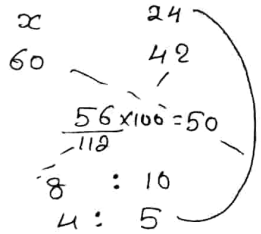
136.

$x \times \frac{130}{100} \times \frac{130}{100} \times \frac{130}{100} = 300$

$x = \frac{300000}{2197}$

≈ 136.55

137.



$\frac{24}{5} \times 4 = 19.2\ kg$

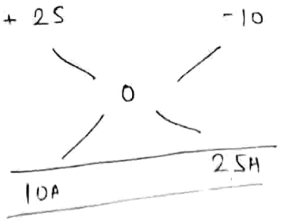
138.

$1(-20) + 1(x) = 20 \times 2$

$x = 40 + 20$

$x = 60\%$ (Ans)

139.



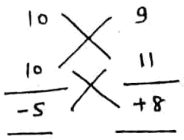
$35A \longrightarrow 3500$

$A = 100$

CP = 100x10 , 100x25

₹ 1000 , 2500

140.



$110 - 90 = 20$

$+80 - (-55) = 135$

$20 \longrightarrow 135$

$(SP)\ 9 \longrightarrow \frac{135 \times 9}{20\ 4}$

$SP = 60.75$ (Ans)

141.

S.P same -

S	6
(S	3)x2
5	6
10	6
15	12

-3

$Loss\% = \frac{-3 \times 100}{15}$

$= 20\%$ Loss

142.

20% discount

5% Loss

$\Rightarrow \frac{80}{95} = \frac{16}{19}$ → SP, M.P

$Profit = \frac{3}{16} \times 100$

$= 18.75\%$

143.

$MP \times \frac{1}{5} = CP \times \frac{1}{2}$

$\frac{MP}{CP} = \frac{5}{2}$ → +3

$Profit = \frac{3}{2} \times 100$

$= 150\%$

144.

Let CP = 100

S.P = 120

Half CP = 50 [New CP]

SP = 120

Profit = 70

$\% = \frac{70}{50} \times 100$

$= 140\%$

145.

30 ₹ (CP) : $\frac{12 \times 15}{12}$ (S.P) + $\frac{5 \times 3}{12}$

$: 15 + \frac{15}{4}$

$: \frac{15 \times 5}{4}$

$8 : 5$ (-3)

Loss% = 3/8

146.

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$\frac{30 \times x}{8x + 45(x-8)} = \frac{10}{11} = \frac{CP}{SP}$

$33x = 8x + 45x - 45 \times 8$

$x = 18$

quantity sold at

₹ 45 = 18 − 8

= 10 kg

147.

$\frac{MRP}{CP} = \frac{4x}{x}$

$\frac{\cancel{x} \times \cancel{160}^{41}}{\cancel{100}} = \frac{(100 - \text{Discount}\%)\cancel{4x}}{\cancel{100}}$

41 = 100 − Discount %

Discount % = 59 %

148.

~~60~~ chair — ~~24560~~

1 Chair = $\frac{2456}{6} \times$

(1) for 20% profit = $\frac{2456}{6} \times \frac{12}{10}$

1 Chair

SP = 491.2 = $\frac{\cancel{24560}^{10} \times \cancel{60}^{5}}{\cancel{2456} \times \cancel{12}}$

then no. of = $\frac{24560}{491.2}$ = 50

= 50 chairs

149.

10	13
10	9
10	9
30	31

+1

% profit = $\frac{1}{30} \times 100$

= 3.33 %

150.

$\frac{210 \times 100}{(100 - L_1)} \times 100 = \frac{420 \times 100}{(100 - L_2)}$

$200 - 2L_1 = 100 - L_2$

$(100 = 2L_1 - L_2)$

$7 = L_1 - L_2$

$- \quad - \quad +$

$93 = L_1, \; L_2 = 86$

151.

Let CP = 100x

40% Loss = 60x (S.P)

10% Loss = 90x (S.P) +30x

30x ⟶ 120

S.P 10% profit ⟶ $\frac{120}{30} \times 110 = 440$

152.

44 CP = x SP

$\frac{44}{x} = \frac{SP}{CP}$

$\frac{\cancel{44}^{4}}{x} = \frac{\cancel{11}}{10}$

x = 40 (Ans)

153.

Sold for 200 ₹ after 40 ₹ discount

So that MRP = 240

$\frac{MRP}{CP} = \frac{13}{10}$

CP = $\frac{\cancel{240}^{12}}{13} \times \cancel{10}$: $\cancel{200}^{SP}$

12 : 13

% Profit = $\frac{1}{12} \times 100$ = 8.34 %

154.

$\frac{CP}{SP} = \frac{10x}{12x}$

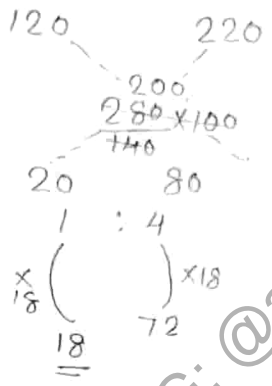
$\frac{10x - 20}{12x - 20} = \times \frac{5}{7}$

$70x - \cancel{140} = 60x - \cancel{100}$

$\cancel{40} = \cancel{10}x$

(4 = x)

CP = 4 × 10



= 40

155.

120 220

200

$\frac{280 \times 100}{140}$

20 80

1 : 4

× 18 ( ) × 18

18 72

156.

$\frac{(1000 - 935)}{935} \times 100$

$= \frac{65}{935} \times 100$

= 6.95 %

157.

CP	SP
100	123

$\frac{100}{3.075} \times \frac{x}{100} = \frac{100}{123}$

$x = \frac{25}{10}$ kg

= 2500 g

158.

CP of 4 pen = CP of 20 − SP of 20

$\frac{SP}{CP} = \frac{4}{5} = \frac{8}{10}$

New CP = 9

New SP = $8 \times \frac{5}{4}$ = 10

P% = $\frac{1}{9} \times 100$ = 11.11 %

159.

	CP	SP
	~~20~~	23
15% less	17 :	~~20~~
	17 :	23

$\frac{6}{17} \times 100$

⇒ 35.3 %

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160.

CP	SP
400	440
850	1000

17 : 22

$\frac{5}{17} \times 100 = 29\frac{7}{17}\%$

161.

CP of 950g $= \frac{36}{1000} \times 950 = 34.2$

SP = 54

P = 54 − 34.2

= 19.8

162.

$72000 \times \frac{4}{5} \times \frac{3}{4} - 2850$

$\Rightarrow 42915$

163.

$P_1 = 15\%$

$P_2 = \frac{20}{80} \times 100$

$= 25\%$

Net $P = 15 + 25 + \frac{15 \times 25}{100}$

$= 40 + 3.75$

$= 43.75$

164.

$R \times \frac{6}{5} \times \frac{7}{5} = 1430$

$R = \frac{1430 \times 25}{42}$

$R = 851.19$

165.

A — 5950

A+B — $\frac{5950 \times 12}{7}$

85% = 850×12

100% = 12000

166.

If S does not any loss

$17000 = S \times 8.5\%$

S = 200000

167.

$15\% = \frac{3}{20}$

	CP	SP	
I	20	23	Same.
II	950	1000	
	19 :	20	
	×20	×23	

400 437

400 → x

437 — $\frac{437x}{400}$

$= 1.0925x$

168.

CP	SP
20	30
800	1000

20×800 : 30×1000

8 : 15

$P\% = \frac{7}{8} \times 100$

$= 87.5\%$

169.

Let total apple = 60

21	21	42	21	105
−10	−5	+15	+x%	27%

$-10 - 5 + 30 + 2x = 135$

$x = 120\%$

SP of 12 $= \frac{3600}{60} \times 12 \times \frac{(100+x\%)}{100}$

$= \frac{3600 \times 12}{60} \times \frac{220}{100}$

$= 1584$

170.

CP − 100

mp — 140

SP − $\frac{140 \times 147}{200}$

$= 102.9$

P% = 2.9%

171.

400 : 350

8 : 7

actual kl of 1 Pac $= \frac{206}{8} \times 7$

$= 175g.$

Cost $= \frac{880}{1000} \times 175 = 154$

SP $= 154 \times \frac{125}{100} = 192.50$

172.

$\frac{70}{930} \times 100 = 7\frac{49}{93}\%$

173.

क्र० मू०	वि० मू०
20	25
800	1000

16 : 25

लाभ% $= \frac{9}{16} \times 100 = 56.25\%$

174.

चावल का अंकित मूल्य = 100

" " क्र० " = 85

कुल " " = 85×50

= 4250

वजन = 5×60

= 300

वि० " = 300 + 100×50

= 4300

लाभ% = $\frac{1050}{4250} \times 100$

= 24.7%

175.

Bruce Wayne

अंकित मूल्य : क्र०मु० = 153 : 85
= 9 : 5

अंकित मूल्य : वि०मु० = 104 : 65
= 8 : 5

अंकित : क्र०मु० : वि०मु० = 72 : 40 : 45

$= \frac{5}{40} \times 100$

लाभ % = 12.5%.

176.

क्र०मु०	वि०मु०
40	42
550	600
55 : 63	

लाभ% $= \frac{8}{55} \times 100$

$= 14.54\%$.

177.

माना 1 वस्तु का क्र०मु० = 1

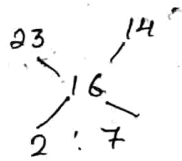
100 " " " = 100

वि०मु० = 119, क्र०मु० = 85

लाभ% $= \frac{119-85}{85} \times 100$

$= 40\%$.

178.



5 — 20

4 — 16

179.

जब वि०मु० बराबर हो

P/L% $= \frac{100(x+y)+2xy}{200+x+y}$

$= \frac{100(20-25)-2\times25\times20}{200+20-25}$

$= \frac{-1500}{195} = -7.7\%$.

180.

क्र०मु०	वि०मु०
1000	950
750	1000
15	19

लाभ% $= \frac{4}{15} \times 100$

$= 26.67\%$.

181.

100	126
900	1000
100	85
900 : 1020	

$\frac{120}{900} \times 100$

$= +13.33\%$.

182.

CP 20 pen — 15

1 " — $\frac{3}{4}$

SP 15 " — 20

1 " — $\frac{4}{3}$

$\frac{245}{\frac{4}{3}-\frac{3}{4}} = 420$

183.

$SP \times y = CP \times 540$

$\frac{SP}{CP} = \frac{540}{y}$

P% = 144 — SP

100 — CP

144 — 540

$y = \frac{540}{144} \times 100$

$= 375$.

184.

1 Person = 4.5 − 3.75

= 0.75

Total amount $= \frac{2700}{4.5} \times 0.75$

$= 450$ kg.

Time " $= 450 \times \frac{80}{100} \times \frac{125}{100}$

$= 45000$

185.

$56000 \times \frac{20}{100} + 22000 \times \frac{15}{100}$

$= 11200 + 3300$

$= 14500$

$P\% = \frac{14500}{78000} \times 100 = \frac{725}{29}$

$= 18\frac{23}{39}$

186.

136 — 614856

36 — $\frac{614856}{136} \times 36$

$= 162756$

187.

CP = 250000

MP = $250000 \times \frac{11}{10}$

= 275000

SP = $275000 \times \frac{92}{100}$

= 253000

SP = CP

x = 253000 − 250000

= 3000

188.

CP = 40 ₹ / kg

1 kg = 100 gm (save)

450 kg = 45 kg "

Black m = $\frac{2520}{45} = 40$

28 : 20

7 : 5

189.

$22.5\% = \frac{9}{40}$

Total = 40

Wasted = 9

Fresh = 31

$31 \times \frac{80}{100} = 24.8$

SP = 40 + 24.8 = 64.8

MP = $\frac{64.8 \times 120}{80} = 97.2$

$\frac{MP}{CP} = \frac{97.2}{40} = 2.43$

190.

$\frac{CP}{SP} = \frac{N}{36}$

$\frac{36-N}{N} \times 100 = 20$

6N = 36 × 5

N = 30

191. NO QUES.

192.

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+40% SP = Same

5 — 7 × 20

4 — 5 × 28

25 — 28 × 5

CP = 100 + 112 + 125 = 337

SP = 140 × 3 = 420

P = 83

P% = $\frac{83}{337} \times 100$

= 24.63%

193.

100g 200g

−24%

+52% 152

194.

7.5% — 15kg

100% — 200kg

New price = $\frac{7400}{200}$ = 37

P% = 32.5 = $\frac{3}{10} + \frac{1}{40}$

= 13 — P

40 — old price

Old price = $\frac{37 \times 100}{92.5}$ = 40

CP = 40 + 13

= 53.

195.

900 — 1000 (2)

15 30 — 38 19

5 25 — 22

675 — 836

161

$\frac{161}{675} \times 100$ = 23.85%

196.

60 20 10 10

+50% +40% +25% x%

30 + 8 + 2.5 + 10x% = 42

x% = 0.15%

197.

12% $\frac{792}{51}$ $\frac{180}{51}$ $\frac{180}{51}$

$\square = \frac{792}{51} + \frac{180}{51} = \frac{972}{51}$

12% $\frac{972}{51}$ $\frac{360}{51}$

$\frac{3600}{\frac{360}{51}} \times 100$ = 51000

198.

CP	SP
3	4
4	5
8	9

8 : 15

7

$\frac{7}{8} \times 100$ = 87.5%

199.

CP − 100 < 126, 141) 15 — 2250

1 — 150

112 — 16800

200.

CP	SP
100	75
55	100

11 : 15

$\frac{400}{11}$

= $36\frac{4}{11}$%

201.

$5y = 20\left[y - \frac{2y^2}{100}\right]$

1500 = 2000 − 40y

y = 12.5

202.

$\frac{5}{8}(+20) + \frac{3}{8}(0)$

= $\frac{25}{2}$ = $12\frac{1}{2}$%

203.

let SP = 5

P = $\frac{1}{5} \times 5 = 1$

CP = 4

= $\frac{1}{4} \times 100$ = 25%

204.

3kg = 3000g

Faulty kl = 2900g

CP of potato = 2.9 × 12

= 34.80

SP of " = 46

P = 46 − 34.80

= 11.20

205.

CP = 200

SP = 300

P = 100

25 × 100 = 2500

206.

28 — 44.8

25 — 40

40 × 5

+5%

210

210 ÷ 4 = 52.5

207.

10 : 13

x : y

5 : 7

x : y = 13 : 14

$\frac{100}{13}$% $7\frac{9}{13}$%

208. THE END.

Bruce Wayne

DISCOUNT

CGL PRE 2021

Q1. The marked price of an article is Rs625. After allowing a discount of 32% on the marked price, there was a profit of Rs25. The profit percentage (correct to the nearest integer) is:
a) 5% b) 4% c) 6% d) 7%

Q2. A shopkeeper allows 28% discount on the marked price of an article and still makes a profit of 30%. If he gains Rs30.90 on the sale of one article, then what is the marked price (to the nearest Rs) of the article?
a) 103 b) 134 c) 194 d) 186

Q3. A shopkeeper allows a 28% discount on the marked price of an article and still makes a profit of 30%. If he gains Rs39.90 on the sale of one article, then what is the marked price (to the nearest Rs) of the article?
a) 200 b) 240 c) 173 d) 133

Q4. Find a single discount percentage equivalent to successive of 10%, 20%, and 25%.
a) 46% b) 18.3% c) 20% d) 55%

Q5. A shopkeeper marks an article x% above the cost price and sells it by allowing 30% discount on the marked price. If there is a loss of 4.8%, then what is the value of x?
a) 30 b) 40 c) 36 d) 35

SSC MTS 2020

Q6. A shopkeeper sells an article at three successive discounts of 10%, x% and x% on the4 marked price of the article. If the marked price and the selling price of the article are Rs 250 and Rs 166.41, respectively, then what is the value of x?
(a) 14 (b) 16 (c) 12 (d) 15

Q7. A shopkeeper earns a profit of 40% on the cost price of an article after giving three consecutive discounts of 5%, 10% and 15% to a customer. What would have been the profit percentage, had the shopkeeper given discounts of 5% and 10% only?
(a) 74.71% (b) 64.71% (c) 66.71% (d) 59.71%

SSC CGL MAINS 2020

Q8. A trader gains 25% by selling an article with 20% discount on its marked price. If the cost price of of the article increases by 30%, then how much discount (in%) should he offer on the same marked price to gain 15% of profit?
(a) 5.12% (b) 4.87% (c) 4.32% (d) 5.08%

Q9. A dealer gains 20% by selling an article at 25% discount on its marked price. If the cost price of the article is decreased by 15%, how much discount percentage should be now give on the same marked price so as to earn the same percentage of profit as before?
(a) 32.50% (b) 35% (c) 36.25% (d) 37.75%

Q10. A dealer offers a cash discount of 20% and still make a profit of 20%. If he further sells 8 articles at a rate of 6 articles, then how much percentage above the cost price does he mark on each article?
(a) 77.5% (b) 100% (c) 112.5% (d) 87.5%

DP 2022

Q11. In a showroom, the price of a vehicle is Rs85,000. The customer gets a cash discount of Rs5000 and gets a scratch card promising a percentage discount of 12.5% to 20%. Determine the difference between the least and maximum selling price (in Rs.) of the vehicle.
a) 6000 b) 8000 c)5000 d) 7000

Q12. A person gives 5% and 15% two successive discount on a watch. If the selling price of the watch is Rs323, then its marked price is:
a) Rs400 b) Rs658 c) Rs524 d) Rs500

Q13. What is the single equivalent discount for successive discounts of 12%, 18% and 24% on the marked price of a television?(correct to 2 decimal places)
a) 45.16% b) 54.25% c) 48.64% d) 34.18%

CPO PRE 22

Q14. A faulty weighing machine reads 1 kg when 900 gm is actually weighted on it. The shopkeeper marked the price of his goods by 10%, but unfortunately he was caught by the metrology department and then they ordered him to repair his weighing machine and gave punishment to sell the goods at 10% discount on cost price for a month. If each customer is now paying Rs20 for 1 kg, then before the raid ___ amount they have paid for the same quantity. (Rounded off to two places of decimal)
a) Rs27.16 b) Rs27.04 c) Rs28.05 d) Rs28.15

Q15. In a showroom the price of a washing machine is Rs65,000. The customer gets cash discount of Rs2,000 and gets a scratch card promising percentage discount of 10% to 15%. Determine the difference between the least and the maximum selling prices of the washing machine.
a) Rs3150 b) Rs3570 c) Rs3200 d) Rs3650

Q16. A shopkeeper sells his items using a faulty balance which measure 25% less. He then marks up his items 15% above the cost price. If he also gives a discount of 10%, then find his net profit percentage on 1 kg items.
a) 32% b) 41% c) 44% d) 38%

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Q17. A supermarket earns 5½% as discount on the total purchasing value and a bonus of ½% on sales more than Rs10,000. What is the total sale value if it earns Rs1990?
a) Rs14,000 b) Rs16,000 c) Rs34,000 d) Rs24,000

Q18. In a showroom the price of a washing machine is Rs65,000. The customer gets cash discount of Rs2,000 and gets a scratch card promising percentage discount of 10% to 15%. Determine the difference between the least and the maximum selling prices of the washing machine.
a) Rs3150 b) Rs3570 c) Rs3200 d) Rs3650

Q19. A merchant marks up the price of his goods by 40% more than the cost price. He then sells 1/5th of his goods at a discount of 10%, half of the goods at the marked price and the rest of the goods at a discount of 20%. Find his profit percentage.
a) 20.4% b) 30.2% c) 28.8% d) 14.6%

Q20. After successive discounts of 10% and 5%, an article was sold for Rs342. What was the original price of the aticle?
a) Rs400 b) Rs342 c) Rs300 d) Rs442

CGL PRE 22

Q21. A grocery shop is offering 10% discount on the purchase of Rs500 and above. A 5% discount is given on the purchase of value above Rs250 but below RS500. A discount of additional 1% is given if payment is made instantly in cash. How much would a customer have to pay by cash if he buys 25 packets of biscuits and one packet is priced at Rs30?
a) Rs670.25 b) Rs668.25 c) Rs675 d) Rs667.05

Q22. If 3 coconuts are offered free on purchase of 12 coconuts, priced Rs25, what is the effective discount on each coconut?
a) 20% b) 24% c) 20.83% d) 15%

Q23. A shopkeeper makes a net profit of 44% on selling an article at successive discounts of 10% and 20%. Find the net profit percentage, if the shopkeeper sells the same article at a discount of 15%.
a) 50% b) 70% c) 30% d) 40%

Q24. A dealer buys an old cooler listed at Rs650 and gets successive discounts of 20% and 10%. He spends Rs38 on its repairs and sells it at a profit of 20%. Find the selling price of the cooler.
a) Rs7.80 b) Rs700 c) Rs790 d) Rs607.2

Q25. A discount of 20% is given for the purchase of two books by a bookseller and a discount of 25% is offered if a customer buys more than two books. A 10% discount is being offered to all the customers on purchase of one book. An additional 5% discount will be given to students. Sohan, a student of M.Com. in college, bought a book for Rs 513. What was the marked price of the book?
a) Rs 650 b) Rs 540 c) Rs 600 d) Rs 605

Q26. A dealer buys an article marked Rs 3,000 and gets successive discounts of 15% and 15%. He spends ₹250 on transportation and sells it at a profit of 20%. Find the selling price of the article.
a) Rs 2901 b) Rs3250 c) Rs 3300 d) Rs3200

Q27. A shop offers a discount of 5 percent and if the total amount payable after the discount exceeds ₹ 2,000, an additional discount of 10 percent is offered. If a customer buys five products costing ₹ 500 each, then find the final amount (in ₹) to be paid by him.
a) Rs2500 b) Rs2375.5 c) Rs2137.5 d) Rs2225.5

CHSL PRE 22

Q28. A discount of 20 percent on article A is equal to the discount of 15 percent on the article B. what is the ratio of the marked price of articles A and B ?
a) 3 : 4 b) 6 : 7 c) 7 : 8 d) 6 : 11

Q29. After giving 10 percent discount on an article there is still a profit of 10 percent. What will be the profit percentage when no discount is given ?
a) 22.22 % b) 26.88 % c) 25% d) 16.66 %

Q30. Marked price of a chair is Rs 1600. After giving two successive discount of 10 percent and x percent, the chair is sold for Rs 1368. What is the value of x ?
a) 4 b) 7 c) 8 d) 5

Q31. Marked price of a computer is Rs 80000. It is sold for Rs 65280 after two successive discounts. If one of the discount is 15 percent, then what is the value of other discount?
a) 6 percent b) 7 percent c) 4 percent d) 5 percent

Q32. A shopkeeper sells a table at a discount of 20 percent and earns a profit of 30 percent. If he sells the same table at 10 percent discount, then what will be his new profit or loss percent?
a) 46.25 percent profit b) 32.5 percent profit
c) 50.5 percent loss d) 40.5 percent loss

ICAR Selection Phase XI

Q33. A trader offers to sell a commodity under any of the two schemes mentioned below:
Scheme 1: The trader offers two successive discounts of 20% and 12.5% on the sale of each unit.
Scheme 2: The trader offers the buyer an option to 'pay for y units, get z units free'. The buyer realizes that if he needs to buy (y + z) units, it does not matter to him which of the two schemes he opts for.
Which of the following options gives a correct ordered pair of (y, z)?
1. (7, 3) 2. (10, 7) 3. (3, 7) 4. (7, 10)

Q34. Victoria purchased items that had a combined marked price of $4,00,000. She was offered a 10% discount on the part of the payment made in cash and a 2% surcharge on the part of the payment made through a credit card. If Victoria paid $3,78,000 in all, how much did she pay through the credit card, inclusive of the surcharge?
1. $1,63,200 2. $1,47,900 3. $1,58,100 4. $1,53,000

Bruce Wayne

The profit of the retailer with the membership card scheme is what % of the profit of the retailer without the membership card scheme?

CGL PRE 23

Q35. A retailer announces a discount of 30% for selling an air-conditioner marked at Rs 92,000. The cost price of the air-conditioner is 70% below the marked price. He offers a further discount of 20% if the buyer presents his membership card ~~scheme is what percentage of the profit of the retailer without the membership card scheme?~~ of the retailer store

1. 62% 2. 65% 3. 70% 4. 74%

CHSL PRE 23

Q36. On an item having a marked price of Rs 1600, successive discounts of y% and z% were offered. As a result, the item was sold for RS 1056. Which of the options below CANNOT be a set of values for y and z?

1. y = 20, z = 17.5 2. y = 4, z = 31.25
3. y = 12, z = 25 4. y = 22, z = 15.5

Q37. A dealer gives a 7% discount on the marked price and gives 1 article free for buying every 25 articles and thus gains 25%. Find the percentage increase in the marked price above the cost price(round up to two decimal places.)

1. 39.78% 2. 37.88% 3. 1.4% 4. 38.87%

Q38. A publisher supplies books to a book-seller at a 20% discount on the list price of Rs 1574.80. If the book – seller sells books at the list price and if his expenses for freight etc. are Rs 45.40, determine his profit.

1. Rs 269.56 2. Rs 285.34 3. Rs 273.50 4. Rs 282.22

Q39. Ramagya sold his computer at three successive discounts of 18%, 12% and 5%. If the marked price of the computer is Rs 36,000, then find the net selling price of the computer. (correct to two places of decimals.)

1. Rs 24,678.72 2. Rs 24,786.72
3. Rs 24,876.72 4. Rs 24,687.72

Q40. A shopkeeper offers the following discount schemes for the purchase of his goods. Find the scheme which has the maximum discount.

(i) Two successive discounts 20% and 10%
(ii) Discount of 10%
(iii) Buy 8 and get 4 free
(iv) Buy 9 and get 6 free

1. (ii) 2. (i) 3. (iv) 4. (iii)

Bruce Wayne

Q41. A shopkeeper sells a table at a discount of 25% on the marked price and earns a profit of 80%. If he sells the same table at a 40% discount, then his new profit is:

1. 31% 2. 44% 3. 33% 4. 41%

Q42. The company offers the following four types of successive discounts on a computer which is listed at Rs 6000.

(i) 25% and 15% (ii) 30% and 10%
(iii) 35% and 50% (iv) 20% and 20%

Which of these offers is best for a customer?

1. First offer 2. Fourth offer
3. Third offer 4. Second offer

SELECTION PHASE XII

Q43. The marked price of a fancy toy is ₹30,000. It is to be sold allowing two successive discounts of 20% and 24%, respectively. On cash payment, an additional 10% discount on the net price is also given. The selling price (in ₹) of the toy is:

a) 16416 b) 16520 c) 18350 d) 17280

Q44. A store is running a scheme for offering a discount of 12% if the customer pays instantly, and a discount of 6% if purchased through credit card. The benefit of the scheme may be split on the amount of payment, however only one discount shall be given on one item. There is no discount on any other type of transaction. Ankur purchased a shirt from the store, whose marked price was ₹2,200, through credit card and paid instantly for the purchase of a coat marked at ₹7,500. What was the total amount (in ₹) billed?

a) 8568 b) 8778 c) 8814 d) 8668

Q45. An item costs Rs15,000. A customer can choose either 30% discount or the buy two get one free offer. Jeevan chose the first offer and Rakshit chose the second offer. Find the difference in their payment for a single item.

a) Rs.750 b) Rs.10,500 c) Rs.500 d) Rs.10,000

Q46. On a machine there is 12% trade discount on the marked price of ₹2,56,000, but the machine is sold for ₹2,05,000 after giving a cash discount. How much is this cash discount (in %)? (Rounded to the nearest whole number)

a) 9% b) 10% c) 8% d) 12%

Q47. An item costs Rs15,000. A customer can choose either 30% discount or the buy two get one free offer. Jeevan chose the first offer and Rakshit chose the second offer. Find the difference in their payment for a single item.

a) Rs.750 b) Rs.10,500 c) Rs.500 d) Rs.10,000

CPO 2024

Q48. Q35. A seller offers a discount of 12% if the total sale price of different products purchased by a single customer is below ₹3,000, and discount of 15% if the total sale value of all the products exceeds ₹3,000. A shirt costing ₹900 was sold to Anand after earning a margin of 9% and also a jacket costing ₹1,900 was sold to him after a margin of 6%. How much does Anand have to pay (in ₹) for the final settlement of the bill?

a) 2,953.60 b) 3,005.40 c) 2,645.60 d) 2,635.60

CHSL 2024

Q49. A dozen pairs of gloves of Rs 180 are available at a discount of 10%. How many pairs of gloves can be bought for Rs 54?

a) 2 b) 8 c) 4 d) 6

Q50. What is the discount that Rohan should offer on the remaining Rs 8,000 of a laptop priced at Rs 48,000, given that, he has already given a 12% discount on the first Rs28,000 and

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8% discount on the next Rs 12,000 to much the discount amount f 9.5% given on the total price ?
a) Rs 402 b) Rs 420 c) Rs 240 d) Rs 204

Q51. Q72. A shopkeeper marks an article at Rs 150 and sells it at a discount of 25%. He also gives a gift worth Rs 2.5. If he still makes a 10% profit, then the cost price (in Rs) of the article is:
a) 100 b) 175 c) 112 d) 125

Q52. Q106. A shopkeeper decides to raise the marked price of an article by 40%. How much percentage discount should be allow to be able to sell the article at the original marked price?
a) $26\frac{3}{7}\%$ b) $24\frac{3}{7}\%$ c) $31\frac{2}{7}\%$ d) $28\frac{4}{7}\%$

Q53. One company is offering a 25% discount on a particular product. Anurag visited a store. He was trying to find a deal that would allow him to save at least Rs 390. How many minimum items should he purchase if each item costs Rs 340?
a) 7 b) 4 c) 6 d) 5

CGL 2024

Q54. Ramesh purchased some intems from a dealer on 19 November 2019. The bill generated was for Rs 5,480. He had also purchased some items on 10 November 2019 having the bill value of Rs 9,800. He cleared both the bills this time and paid the total amount in cash. If the dealer gives a scheme of 2% discount on the payments done within 10 days and 5% for the payments made in cash at the time of purchase, then find the amount paid by Ramesh on 19 November 2019.
a) Rs 14,850 b) Rs 14,810 c) Rs14,890 d) Rs 14,950

1	C	2	D	3	B
4	A	5	C	6	A
7	B	8	C	9	C
10	B	11	A	12	A
13	A	14	A	15	A
16	D	17	C	18	A
19	C	20	A	21	B
22	A	23	B	24	D
25	C	26	A	27	C
28	A	29	A	30	D
31	C	32	A	33	A
34	D	35	B	36	D
37	A	38	A	39	A
40	C	41	B	42	C
43	A	44	D	45	B
46	A	47	C	48	D
49	C	50	C	51	A
52	D	53	D	54	B

1.

$$\frac{25}{\left(625\times\frac{68}{100}-25\right)}\times 100 \Rightarrow \frac{100}{16} = 6\%$$

2.

$$\frac{30.90}{72\times\frac{3}{10}}\times 130 \Rightarrow 186 \text{ Ans}$$

3.

$$\frac{39.90}{72\times\frac{3}{10}}\times 100 \Rightarrow 240 \text{ Ans}$$

4.

$$\begin{array}{l} 10 : 9 \\ 5 : 4 \\ 4 : 3 \\ \hline 50 : 27 \end{array}$$

$$D\% = \frac{23}{50}\times 100 \Rightarrow 46\% \text{ Ans}$$

5.

$$\frac{CP}{MP} = \frac{100-30}{100-4.8} = \frac{70}{95.2} \rightarrow 25.2$$

$$\text{Markup\%} = \frac{25.2}{70}\times 100 = 36\% \text{ Ans}$$

6.

$$250\times\frac{9}{10} = 166.41$$

Bruce Wayne

$$2500 : 1849$$
$$(50)^2 : (43)^2$$
$$50 : 43$$

$D\% = 14\%$ Ans

7.

M-1 $\frac{140 \times 100}{85} = 164.71\%$

Profit = 64.71%

M-2 $\frac{CP}{MP} = \frac{100 \times \frac{19}{20} \times \frac{9}{10} \times \frac{17}{20}}{140} = \frac{2907}{5600}$

$= 164.71\%$, P% = 64.71%

8.

$\frac{CP}{MP} = \frac{100-20}{100+25} = \frac{80}{125}$ → 5.4

New CP = $80 \times \frac{13}{10} \Rightarrow 104$

New SP = $104 \times \frac{23}{20} \Rightarrow 119.6$

Discount % = $\frac{5.4}{125} \times 100 = 4.32\%$ Ans

M-2

CP : MP

80 : 125

104 (New CP)

$\frac{104 \times \frac{23}{20}}{125} \times 100 = 95.68\%$

D% = 4.32% Ans

9.

$\frac{CP}{MP} = \frac{100-25}{100+20} \Rightarrow \frac{75}{120} = \frac{50}{80}$ → 29

New CP → $50 \times \frac{17}{20} = 42.5$

New SP → $42.5 \times \frac{120}{100} = 51$

Discount % = $\frac{29}{80} \times 100 = 36.25\%$ Ans

M-2

$\frac{75 \times \frac{17}{20} \times \frac{6}{5}}{120} \times 100 = 63.75\%$

Discount % = 36.25%

10.

CP : MP

80 : 120

6 : 8

12 : 24

1 : 2

100% MARKUP

11.

85000 - 5000

= 80000

Diff = $80000\left(\frac{7}{8} - \frac{4}{5}\right)$

$= 80000 \times \frac{3}{40}$

= 6000

12.

323 = SP

$5 + 15 - \frac{5 \times 15}{100}$

$= 19.25$

$= 100 - 19.25$

$= 80.75$

$= \frac{323}{80.75} \times 100$

$= 400$

13.

$12 + 18 - \frac{12 \times 18}{100}$

$30 - 2.16$

$= 27.84$

$24 + 27.84 - 24 \times 27.84$

$51.84 - 6.6816$

$= 45.1584 \approx 45.16\%$

14.

$P\% = \frac{100}{900} \times 100 = 11.11\%$

Total $P\% = 11.11 + 10 + \frac{11.11 \times 10}{100}$

$= 22.22\%$

Actual cost of 1 kg Sugar

$= \frac{100}{(100-10)} \times 20 = 22.22$

$SP = \frac{(100 + 22.22)}{100} \times 22.22$

$= \frac{122.22 \times 22.22}{100}$

≈ 27.16

15.

65000-2000 = 63000

Diff = $63000\left(\frac{9}{10} - \frac{17}{20}\right)$

$= 63000 \times \frac{10}{10 \times 20}$

= 3150

16.

CP = 1000

$mp = 1000\left(\frac{100+15}{100}\right) = 1150$

Discount = $1150 \times \frac{10}{100} = 115$

SP = 1150 - 115 = 1035

SP of 750g = 1035

CP " " = 750

$P\% = \frac{285}{750} \times 100 = 38\%$

17.

Total Sale = x

$x \times \frac{5.5}{100} + (x - 10k) \times \frac{5}{100} = 990$

$6x = 199000 + 5000$

$x = 34000$

18.

65000 - 2000 = 63000

Diff = $63000\left(\frac{9}{10} - \frac{17}{20}\right)$

$= 63000 \times \frac{10}{10 \times 20}$

= 3150

19.

CP = 100

MP = 140

Total goods = 100

85 : 1/2

$140 \times 20 \times \frac{90}{100}$: 50×140

$140 \times \frac{30 \times 80}{100}$

$140 \times 18 + 140 \times 50 + 140 \times 24$

$140 (18 + 50 + 24)$

$= 140 \times 92 = SP$

$100 \times 100 = CP$

$P\% = \frac{(12880 - 10000)}{10000} \times 100$

$= 28.8\%$

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20.

$\frac{342 \times 100 \times 100}{90 \times 95}$

400

21.

Total = 25 × 30 = 750

$750 \times \frac{90}{100} \times \frac{99}{100}$

= 668.25

22.

$\frac{3}{15} \times 100 = 20\%$

23.

$10 + 20 - \frac{10 \times 20}{100} = 28\%$

$\frac{MP}{CP} = \frac{144}{72} = \frac{200}{100}$] 70% Ans

$\frac{200 \times 85}{100} = 170$]

24.

$SP = \left[650 \times \frac{80}{100} \times \frac{90}{100} + 98\right] \times \frac{120}{100}$

$= \frac{506 \times 6}{5} = \frac{3036}{5}$

= 607.2

25.

MP = x

$x \times \frac{19}{20} \times \frac{9}{10} = 513$

x = 600

26.

$\left(3000 \times \frac{17}{20} \times \frac{17}{20} + 250\right) \times \frac{6}{5}$

$= 2417.5 \times \frac{6}{5}$

= 2901

27.

C.P. of 5 product

= 500 × 5 = 2500

$SP = 2500 \times \frac{(100-5)}{100} \times \frac{(100-10)}{100}$

$= 2500 \times \frac{95}{100} \times \frac{90}{100}$

= 2137.5

28.

A × 20% = B × 15%

A : B = 3 : 4

29.

$\frac{MP}{CP} = \frac{100+P}{100-D}$

$= \frac{110}{90}$

$\frac{MP}{CP} = \frac{11}{9}$

$= \frac{2}{9} \times 100$

= 22.22%

30.

$1600 \times \frac{90}{100}$

= 1440 : 1368

72

$= \frac{72}{1440} \times 100$

= 5%

31.

$80000 \times \frac{85}{100}$

= 68000 : 65280

2720

$= \frac{2720}{68000} \times 100$

= 4%

32.

$\frac{MP}{CP} = \frac{100+P}{100-D}$

$= \frac{130}{80}$

$\frac{MP}{CP} = \frac{130}{80}$] -10%

SP = 117

$P\% = \frac{37}{80} \times 100$

= 46.25%

33.

S.I

20% = $\frac{1}{5}$

12.5% = $\frac{1}{8}$

5 4

8 7

40 28

$\frac{12}{40} \times 100 = 30\%$

S.II

$D\% = \frac{2}{(y+2)} \times 100$

by option 7, 3) Ans

$\frac{3}{10} \times 100 = 30\%$

34.

Cash 90% C.card 102%

378K × 100 / 400K

94.5

7.5 : 4.5

15 : 9

5 : 3

8 ⟶ 400K

C.card = $\frac{400K}{8} \times 3 \times 102\%$

= 153K

= 153000

35.

MP = 100

CP = 70% × 100 + 100 = 30

SP = 70

P = 70 − 30 = 40 without membership

SP = 70 − 70 × 20%

= 56

P = 56 − 30

= 26

$P\% = \frac{26}{40} \times 100$

= 65%

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36.

$1600 \times \frac{100-y}{100} \times \frac{100-z}{100} = 1056$

$10000 - 100z - 100y + yz = 6600$

$100z + 100y - yz = 3400$

By options

$y = 22, \ z = 15.5$

37.

mp of 1 article = 1

95 " = 25

26 SP = $25 \times \frac{93}{100}$

$= \frac{93}{4}$

26 CP = $\frac{93}{4} \times \frac{100}{125}$

$= \frac{93}{5}$

1 CP = $\frac{93}{5 \times 26}$

% = $\frac{1 - \frac{93}{5 \times 26}}{\frac{93}{5 \times 26}} = 39.78\%$

38.

CP = $1574.80 \times \frac{80}{100} + 45.4$

$= 1305.24$

P = $1574.80 - 1305.24$

$= 269.56$

39.

$36000 \times \frac{82}{100} \times \frac{88}{100} \times \frac{95}{100}$

$= 24678.72$

40.

(i) $20 + 10 - \frac{20 \times 10}{100} = 28\%$

(ii) 10%

(iii) $\frac{4}{8+4} \times 100 = 33\frac{1}{3}\%$

(iv) $\frac{6}{6+9} \times 100 = 40\%$

41.

CP	SP	mp
50	90	120

-80% -25%

Dis = 40%

CP = 72

P% = $\frac{22}{50} \times 100 = 44\%$

42.

(i) $40 - 3.75 = 36.25$

(ii) $40 - 3 = 37$

(iii) $40 - 1.75 = 38.25$

(iv) $40 - 4 = 36\%$

43.

SP = $30000 \times \frac{80}{100} \times \frac{76}{100} \times \frac{90}{100}$

$= 16416$

44.

2200 − 6% = 2068

7500 − 12% = 6600

8668

45.

Jeevan Dis = 30%

Rakshit " = 0%

[for 1 item]

Diff = 30% =

$15000 \times \frac{70}{100} = 10500$

46.

$256000 \times \frac{88}{100} = 225280$

Discount = 225280 − 205000

= 20280

D% = $\frac{20280}{225280} \times 100 = 9\%$

47.

I II

30% $\frac{1}{3} = 33\frac{1}{3}\%$

$\frac{10}{3}\%$

$15000 \times \frac{10}{300} = 500$

48.

CP	Cost to Anand
900	$900 \times \frac{109}{100} = 981$
1900	$1900 \times \frac{106}{100} = 2014$

Total Sale = 2014 + 981 = 2995

$2995 \times \frac{88}{100} = 263.56$

49.

$\frac{180}{12} \times \frac{9}{10}$ — 1 Pc

$54 = \frac{54 \times 12 \times 10}{180 \times 9} = 4$

50.

$\frac{7}{12} \times 12 + \frac{3}{12} \times 8 + \frac{2}{12} x = 9.5$

$2x = 114 - 108$

$x = 3\%$

$\frac{8000 \times 3}{100} = 240$

51.

mp = 150

SP = $150 \times \frac{3}{4} - 2.5 = 110$

CP = $\frac{110}{11} \times 10 = 100$.

52.

100 — 140

5 — 7

$\frac{2}{7} \times 100 = 28\frac{4}{7}\%$

53.

$x \times 340 \times \frac{25}{100} = 390$

$x = \frac{390}{85} = 4.5$

min = 5.

54.

19 Nov 19 — 5480

10 Nov 19 — 9800

$\frac{9800 \times 98}{100} + \frac{5480 \times 95}{100}$

$= 9604 + 5206 = 14810$

55.

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Partnership

SSC CGL PRE 2021

Q1. A, B and C started a business in partnership. Initially, A invested Rs29,000, while B and C invested Rs25,000 each. After 4 months, A withdrew Rs3,000. After 2 more months, C invested Rs12,000 more. Find the share of C (in Rs) in the profit of Rs33,200 at the end of the year.

a) 10,800 b) 10,000 c) 12,400 d) 11,067

Q2. A and B had a joint business in which A invested Rs60,000 in the business for one year. After 3 months B invested Rs80,000. At the beginning of the second year, A invested Rs30,000 more and B withdrew Rs5,000. At the end of two years, profit earned by A is Rs35,880. What is the profit (in Rs) earned by B, if they distributed half of the total profit equally and rest in the capital ratio?

a) 69,920 b) 38,060
c) 58,940 d) 34,040

SSC MTS 2020

Q3. A and B started a business by investing Rs 70,000 each. After 10 months A invests an additional amount of Rs 40,000. After 2 more months B withdraws Rs 20,000. After 2 more months a third person C joins the business and invests 40,000. It at the end of 2 years, C gets Rs 7,500 as his share of profit, then what is A's share in the profit?

(a) 42,000 (b) 20,625 (c) 25,500 (d) 27,000

Q4. X,Y,Z enter into a partnership venture with a capital of Rs 1,20,000, in which the contribution of Y and Z are, respectively, 40% more and Rs 1,000 more than that of X. The profit earned is 20% of the capital. Out of this profit,10% goes towards some incidental expenses. What is the share (in Rs) of X out of it?

(a) 4,800 (b) 6,300 (c) 7,000 (d) 7,500

MAINS 21

Q5. A, B and C started a business with intial investments of 20000, 25000 and 10000, respectively. After 5 months from start, A invested 4000 more. After 6 months fro start, C invested 8000 more. After 4 months from start, B withdrew 8000.At the end of the year, they will receive a profit of 'x'. In what ratio they will share the profit?

a) 67: 59: 42 b) 42: 59: 71 c) 71: 42: 59 d) 63: 59: 42

Q6. A, B and C started a business with the investment of ₹100000, and ₹140000 and ₹ 200000 respectively. After 3 months, C left the business. 7 months after C left the business, B also left the business. B and C took their investments with them. At the end of the year, C recived his share of profit as ₹1155. What is the total of profits of A and B?

a) Rs6150 b) Rs5555 c) Rs5005 d) Rs4995

Q7. A sum of ₹1250 has a distributed among A, B, C and D. Total share of B and D is equal to (14/11) of total share of A and C. Share of D is half of share of A. Share of C is 1.2 of share of A. What are the shares of A, B, C and D.

a) ₹250, ₹575, ₹300, ₹175 b) ₹250, ₹525, ₹300, ₹125
c) ₹350, ₹525, ₹300, ₹125 d) ₹250, ₹575, ₹300, ₹125

CGL MAINS 22

Q8. A starts a business with Rs75,000 and B joins the business 5 months later with an investment of Rs 80,000. After 1 year, they earn a profit of Rs 4,08,800. Find the share of A and B (in Rs).

a) 2,52,000 and 1,56,800 b) 2,50,000 and 1,58,800
c) 2,48,000 and 1,60,800 d)2,49,500 and 1,59,300

ICAR & Selection Phase XI

Q9. Mohit and Ravi started a business with their capitals in the ratio $\frac{2}{15} : \frac{1}{6}$. After 4 months, Mohit increased his capital by 25% and Ravi reduced his capital by one-fifth. At the end of a year, if B's share in the annual profit was Rs 20.8 lakhs, then what was the annual profit (in Rs lakhs)?

a. 41.6 b. 31.2 c. 43.2 d. 44.8

CHSL PRE 23

Q10. A is a working partner and B is a sleeping partner in a business. A invested Rs 30,000 and B invested Rs 50,000. A receives 20% of the profit for managing the business and the rest is divided in proportion to their capital. What does B get out of the profit of Rs 10,000?

1. Rs 4000 2. Rs 4500 3. Rs 5500 4. Rs 5000

SELECTION PHASE XII

Q11. Three partners decided to start a business. They decided to donate 10% of the profit to a charity organisation and then the remaining profit would be shared among first, second and third partner in the ratio 1 : 2 : 2. The total profit received was ₹1,80,000. Find the share of the first partner.

Ans 1. ₹31,800 2. ₹29,600 3. ₹33,200 4. ₹32,400

CGL 2024

Q12. Three people A, B and C, invest in a business in the ratio 2 : 3 : 5. It was decided that 9% of the profits will go to charity. If the total profit was ₹2,50,000, then find the share of C in the profit (in ₹).

a) 1,26,950 b) 1,21,850 c) 1,11,650 d) 1,13,750

ANSWERS

1	C	2	D	3	A
4	B	5	A	6	C
7	D	8	A	9	C
10	D	11	D	12	D

1.

A: 29K×4, 26K×8 → 162, 81
B: 25K×12 → 150, 75
C: 25K×6, 31K×6 → 186, 93

$= \frac{33200}{249} \times 93$

$= 12400$

2.

A: 60K×12, 90K×12 → 180
B: 80K×9, 75K×12 → 162

180 : 162
10 : 9

Total = 4P

A's profit

$\frac{10}{19} \times 2P + P = 35880$

$P = 17480$

B's

$P + \frac{9}{19} \times 2P$

$= \frac{37}{19} \times 17480$

$= 34040$

3.

A: 70K×24, 40K×14 → 28
B: 70K×12, 50K×12 → 18
C: 40K×10 → 5

7500 : 18 : 5

$\frac{7500}{5} \times 28$

$= 42000$

4.

x: 100x → 340x + 1000 = 120000
y: 140x → $x = 350$
z: 100x + 1000

35K 49K 36K

35 : 49 : 36

Total Profit:

$120K \times \frac{20}{100} \times \frac{90}{100}$

$= 21600$

$x \Rightarrow \frac{21600}{120} \times 35$

$= 6300$

5.

A: 20K×5, 24K×7 → 26800
B: 25K×4, 17K×8 → 23600
C: 10K×6, 18×6 → 16800

268 : 236 : 168

67 : 59 : 42

6.

A: 100K×12 → 6
B: 140K×10 → 7
C: 200K×3 → 3

$\frac{1155}{3} \times 13$

$= 5005$

7.

$(B+D) = \frac{14}{11}(A+C)$

$A = 2D$

$C = 1.2A$

$11B + 11D = 14\left(A + \frac{6}{5}A\right)$

$11B + \frac{11}{2}A = \frac{14 \times 11A}{5}$

$11B = \frac{253A}{10}$

$B = \frac{23}{10}A$

$A + B + C + D = 1250$

$A + \frac{23}{10}A + \frac{6}{5}A + \frac{A}{2} = 1250$

$5A = 1250$

$A = 250$

$B = 575$

$C = 300$

$D = 125$

8.

A: 75K×12 → 45
B: 80K×7 → 28

$A \Rightarrow \frac{408800}{73} \times 45$

$= 252000$

$B = \frac{408800}{73} \times 28$

$= 156800$

9.

m: $\frac{2}{15}$
R: $\frac{1}{6}$

4×4 : 5×4

5×8 : 4×8

56 : 52

14 : 13

$13 \rightarrow 20.8$

$13 + 14 \Rightarrow 27 \Rightarrow \frac{20.8}{13} \times 27$

$\Rightarrow 43.2$

10.

A: 30K
B: 50K

3 : 5

B's Share = $\frac{10000 \times 80}{100} \times \frac{5}{8}$

$= 5000$

11.

A : B : C = 1 : 2 : 2

$\frac{1800000}{10} \times 9 \times \frac{1}{5}$

$= 32400$

12.

$\frac{250000 \times 91}{100} = 227500$

2 : 3 : 5 → 10 → 227500

5 → 113750

13. THE END.

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Simple Interest

CHSL 2018

Q.1 A certain sum was invested on simple interest. The amount to which it had grown in five years was $1\frac{1}{4}$ times the amount to which it had grown in three years. The percentage rate of interest was:
(a)25% (b)20% (c)15% (d)10%

MTS 2019

Q.2 The simple interest on a sum is equal to the sum of itself while the rate is same as the number of years for which it is invested. The number of years is equal to:
(a)8 (b)10 (c)1 (d)5

Q.3 A sum of ₹1500 is invested at simple interest for x months. If the rate of interest is $\frac{x}{9}\%$ per annum, then the sum grows to ₹1580. What is the value of x?
(a)32 (b)2.4 (c)24 (d)3.2

Q.4 If the simple interest on ₹28000 at some rate for three years is ₹225 more than the simple interest on ₹27000 at the same rate for 3 years, then what will be the simple interest on ₹35500 for $2\frac{3}{5}$ years at the same rate?
(a)₹6922.50 (b)₹6953 (c)₹6966.50 (d)₹6723.50

CGL MAINS 2018

Q.5 A sum of ₹8400 amounts to ₹11,046 at 8.75% p.a. simple interest in a certain time. What is the simple interest on the sum of 9600 at the same rate for the same time?
(a)₹2990 (b)₹3012 (c)₹2686 (d)₹3024

Q.6 A sum of ₹5,000 is divided into two parts such that the simple interest on the first for $4\frac{1}{5}$ years at $6\frac{2}{3}\%$ p.a. Is double the simple interest on the second part for $2\frac{3}{4}$ years at 4% p.a. What is the difference between the two parts?
(a)560 (b)600 (c)620 (d)680

Q.7 A sum amounts to ₹14,395.20 at 9.25% p.a. simple interest in 5.4 years. What will be the simple interest on same sum at 8.6% p.a. in 4.5 years?
(a)₹3797.76 (b)₹3627 (c)3672 (d)₹3715.20

Q.8 A person invested one-forth of the sum of ₹25000 at a certain rate of simple interest and the rest at 4% p.a. higher rate. If the total interest received for 2 years is ₹4,125. What is the rate at which the second sum was invested?
(a)5.255% (b)9.25% (c)7.5% (d)9.5%

CHSL 2018

Q.9 A borrows a sum of ₹2000 from his friend B on 31 December 2007 on the condition that he will return the same after one year with simple interest at 8%. However, A gets into a position of returning the money on 1 July 2008. How much amount he has to return to B?
(a)₹2088 (b)₹2080
(c)₹2070 (d)₹2200

Q.10 A borrows a sum of ₹3000 from his friend B on 31 December 2011 on the condition that he will return the same after one year with simple interest at 15% However, A get into a position of returning the money on 31 August 2012. How much amount he has to return to B?
(a)₹3300 (b)₹3200 (c)₹3310 (d)₹3305

CPO 2018

Q.11 A sum of ₹15,000 is invested partly at 12% per annum and the remaining at 10% per annum simple interest. If the total interest at the end of 2 year is ₹3,344 how much money was invested at 10% per annum?
(a)6400 (b)6600 (c)6500 (d)6200

Q.12 A borrowed a loan from B at 8% simple interest for 2 years and repaid the loan with interest totalling ₹1,91,864. The amount of loan taken by A is:
(a)₹1,64,492 (b)₹1,66,540 (c)₹1,65,400 (d)₹1,68,920

MTS 2019

Q.13 A sum of money becomes double of itself in 50 months when invested on simple interest. What is the rate of interest per annum?
(a)20% (b)25% (c)24% (d)26%

Q.14 A certain sum is lent at x% p.a. simple interest for $\frac{x}{3}$ years. The simple interest of this sum is equal to one-third of this sum. What is the value of x?
(a)9 (b)10 (c)6 (d)12

Q.15 What is the simple interest on ₹35000 at $\frac{18}{7}\%$ p.a. for a period of 9 months?
(a)₹875 (b)₹600 (c)₹700 (d)₹675

Q.16 If the simple interest on a sum of ₹x at 6% p.a. for two years is double the simple interest on another sum of ₹y at 9% p.a. for three years, then which of the following is true?
(a)$3x = 7y$ (b)$x = 4.5y$ (c)$2x = 5y$ (d)$3x = 7y$

CPO 2019

Q.17 A person invested a sum of ₹18,600 at x% p.a. and another sum that is twice the former at(x+2)% p.a., both at a simple interest. If the total interest earned on both investments for $3\frac{1}{2}$ years is ₹23,110.50, then the rate of interest p.a. on the second investment is:
(a)13% (b)10.5% (c)12.5% (d)11%

Q.18 Two equal sums (in ₹) are lent at 8% and 4% simple interest p.a. respectively at the same time. The first sum is

received 2 years earlier than the other and the amount received in each case is ₹14500, each sum is:
(a)₹13200 (b)₹12500 (c)₹12000 (d)₹12800

Q.19 Two equal sums are lent at 10% and 8% p.a. on simple interest for 't' years and (t+2) years respectively. Amount received in each case is ₹36,900. Each sum is:
(a)₹20,200 (b)₹20,500 (c)₹18,100 (d)₹21,500

CHSL 2019

Q.20 A sum of ₹12,000 was taken at a rate of simple interest. After four months, ₹6000 more was borrowed and rate of interest on the total principal was doubled that that of the previous rate. At the end of the year, if total 2800 was paid as the interest. Find the rate that was applicable in the initial.
(a)12% (b)16% (c)10% (d)14%

Q.21 A man takes a loan of some amount at some rate of simple interest. After three years, the loan amount is doubled and the rate of interest is decreased by 2%. After next 5 years, if the total interest paid on the whole is ₹13,600, which is equal to the same when the first amount was taken for $11\frac{1}{3}$ years, then the loan taken initially is:
(a)₹10,000 (b)₹12,500 (c)₹12,000 (d)₹13,600

Q.22 A person invested a total of ₹9,000 in three parts at 3%, 4% and 6% per annum on simple interest. At the end of a year, he received equal interest in all three cases. The amount invested at 6% is:
(a)₹4,000 (b)₹3,000 (c)₹5,000 (d)₹2,000

CGL PRE 2020

Q.23 Two equal sums were lent on simple interest at 6% and 10 % per annum respectively. The first sum was recovered two years later than the second sum and the amount in each case was ₹1105. What was the sum (in ₹) lent in each scheme?
(a)936 (b)850 (c)891 (d)900

Q.24 A certain sum amounts to ₹81840 in 3 years and to ₹92400 in 5 years at x% p.a. under simple interest. If the rate of interest is becomes (x+2)%, then in how many years will the same sum double itself?
(a)10 (b)8 (c)20 (d)$12\frac{1}{2}$

Q.25 A sum of ₹25600 is invested on simple interest partly at 7% per annum and the remaining at 9% per annum. The total interest at the end of 3 years is ₹5832. How much money (in ₹) was invested at 9% per annum?
(a)9600 (b)7600 (c)16000 (d)18000

CHSL 2020

Q.26 A sum lent at simple interest amounts to ₹6,240.80 in one year and to ₹7,563.20 in 4 years. The sum (in ₹) and the rate of interest per annum, respectively, are:
(a)5,800, 7.6% (b)5,800, 8.5%
(c)6,200, 7.6% (d)6,200, 8.5%

Q.27 A certain sum of money amounts to ₹9,766 in 3 years at simple interest at R% per annum and to ₹10,849 in $4\frac{1}{2}$ years at the same rate of simple interest. The value of R is:
(a)9.5 (b)9 (c)8.5 (d)8

Q.28 A man invests an amount of ₹1,05,750 at simple interest in the name of his son, daughter and his wife in such a way that they get the same interest after 3, 4 and 5 years, respectively. If the rate of interest is 5% per annum, then the amount invested for the wife is:
(a)₹25,000 (b)₹28,000 (c)₹30,000 (d)₹27,000

Q.29 A sum of ₹4,000 amounts to ₹5,008 in three years simple interest at the rate of x% per annum. If the interest rate becomes (x+2.6)%, then revised maturity amount will be:
(a)₹5,330 (b)₹5,420 (c)₹5,200 (d)₹5,320

Q.30 A sum of ₹x amounts to ₹8,563.50 in $3\frac{1}{2}$ years and to ₹10,527 in 7 years at y% p.a. simple interest. The value of x and y, respectively, are:
(a)6600 and $8\frac{1}{2}$ (b)6800 and $8\frac{1}{2}$
(c)7000 and 8 (d)6600 and 8

SSC SELECTION PHASE IX

Q.31 The simple interest on a certain sum of RsP at a rate of r% per annum for 3 years is Rs11,250 and the compound interest on the same sum for 2 years at the same rate percent p.a. is Rs7,650. What is the value of P and r, respectively?
(a) Rs93750 and 4% (b) Rs93750 and 5%
(c) Rs92500 and 6% (d) Rs92500 and 7%

Q.32 The simple interest on a certain sum is 50% of the sum in 8 years at a certain rate per cent p.a. what will be the interest (in Rs) on a sum of Rs7,200 at the same rate in $5\frac{2}{3}$ years at simple interest?
(a) 1875 (b) 1950 (c) 2550 (d) 1260

SSC CGL PRE 21

Q33. A certain sum on simple interest becomes Rs49,600 in 3 years and Rs56,000 in 5 years. If the rate of interest had been 2% more, then in how many years would the sum have doubled?
a) 10 b) 8 c) 12 d) 20

Q34. Simple interest on a certain sum is one-fourth of the sum and the interest rate percentage per annum is 4 times the number of years. If the rage of interest increases by 2%, then what will be the simple interest (in Rs) on Rs5,000 for 3 years?
a) 300 b) 1,500 c) 2,000 d) 1,800

Q35. A sum of Rs17,200 is lent out at simple interest in two parts for 2 years at 8% p.a, 10% p.a., respectively. If the total interest received after 2 years is Rs3,008, then the money lent (in Rs) at the rate of 8% p.a is:
a) 9,800 b) 9,200 c) 10,800 d) 6,400

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Q36. A certain sum amounts to Rs 4,600 after 5 years and to Rs 6,000 after 8 years at the same rate of simple interest per annum. What will be the simple interest on a sum of Rs 8,500 for $6\frac{1}{2}$ years at the same rate?
(a) 11,375 (b) 11,460 (c) 10,215 (d) 10,515

Q37. A man takes a loan of Rs 6,000 from his friend on 1st January 2019 with the condition that he will repay with accrued simple interest at the rate 6.25% , as and when the interest touches Rs 75. On which date does the loan period expire?
(a) 15th March 2019 (b) 14th February 2019
(c) 20th October 2019 (d) 15th January 2020

Q38. A certain sum amounts to Rs 15,748 in 3 years at r% p.a. simple interest. The same sum amounts to Rs 16,510 at (r+2)% p.a simple interest in the same time. What is the value of r% ?
(a) 8 (b) 9.5 (c) 9 (d) 8.5

Q39. A certain sum was invested on simple interest for a period of seven years. During the period of the sixth and the seventh years combined, the interest earned was Rs 292. If the maturity amount is Rs 3,942, then what is the rate percentage of the interest ?
(a) 5 (b) 6.25 (c) 2.5 (d) 2

Q40. A person invested a sum of Rs 6,500 at x% per annum at simple interest and a sum of Rs 7,500 at (x-2)% per annum at simple interest. If the total interest earned on both the investments for 3 years is Rs 3,750. Then the rate of interest on the first investment is:
(a) 14% (b) 8% (c) 10% (d) 12%

DP2022

Q41. A mobile phone is available for Rs25,000 or Rs5200 down payment, followed by 4 equal monthly instalments. If the rate of interest is 25% p.a. simple interest, calculate the amount of each instalment.
a) Rs5020 b) Rs5200 c) Rs5362 d) Rs4950

Q42. What annual installment will discharge a debt of Rs3270 due in 3 years at 9% per annum simple interest?
a) Rs1075 b) Rs1050 c) Rs1090 d) Rs1000

Q43. A digital note-pad is available for Rs25,000 cash or Rs2500 down payment followed by 4 equal monthly instalments. If the rate of interest charged is 24% per annum simple interest, what is the monthly instalment(in Rs rounded off to the nearest tens)?
a) 5790 b) 5890 c) 5900 d) 5800

Q44. A milkman borrowed a sum of Rs2500 from two moneylenders for one loan on simple interest at the rate of 5% and 7%, respectively, for a period of 2 years. If the total interest paid by him was Rs276, then how much did he borrow at the rate of 7% p.a?
a) Rs700 b) Rs675 c) Rs650 d) Rs550

Q45. The simple interest on Rs7,300 at 15% p.a. from 28 April to 4 November, approximately is:
a) Rs750.00 b) Rs547.50 c) Rs1,095.50 d) Rs570.00

Q46. A person invested a total of Rs57,500 at 4%, 5%, and 8% per annum simple interest. At the end of the year, he received equal interest in all the three cases. The amount invested at 5% was:
a) Rs25,000 b) Rs20,750 c) Rs20,000 d) Rs37,500

CPO PRE 22

Q47. Find the difference between the compound interest and simple interest when a sum of Rs15,625 is invested for 3 years at 4% per annum.
a) Rs76 b) Rs96 c) Rs56 d)Rs86

Q48. Due to pandemic, the population of a city reduced at the rate of 2% per annum, what will be its total population after 2 years if the present population of the city is 45,000?
a) 40538 b) 44521 c) 41568 d) 43218

CGL PRE 22

Q49. In how many least number of complete years a sum of money become more than four times of itself at the rate of 50 percent per annum on simple interest?
a) 9 years b) 7 years c) 6 years d) 5 years

Q50. Damani purchased an item costing Rs7500, and paid Rs3500 as a down payment for the same. If the simple interest charged for the remaining amount is 9% per annum and Damani cleared all dues after 4 months of the purchase, how much did Damani pay after 4 months as interest?
a) Rs120 b) Rs100 c) Rs132 d) Rs125

Q51. What annual instalment will discharge a debit of Rs5,664 in 4 years at 12% simple interest?
a) Rs1230 b) Rs1210 c) Rs1200 d) Rs1220

Q52. Rs5,000 is divided into two parts such that if one part is invested at 4% and the other at 5%, then the whole annual interest from both the sums is Rs223. How much was invested at 4%.
a) Rs2,600 b) Rs2,700 c) Rs2,400 d) Rs2,300

Q53. What annual instalment will discharge a debt of Rs9600 due in 5 years at 10% simple interest?
a) Rs1450 b) Rs1550 c) Rs1500 d) Rs1600

Q54. Find the simple interest on Rs2,700 for 8 months at 5 paisa per rupee per month?
a) Rs 950 b) Rs 720 c) Rs 540 d) Rs 1080

Q55. A sum is deposited in a bank which gives simple interest. The sum becomes 1.25 times in 3 years, if there is a requirement of Rs7,60,000 after seven years, how much amount (in Rs) should one deposit to fulfil the requirement?
a) 5,20,000 b) 5,70,000 c) 4,80,000 d) 6,00,000

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Q56. A person borrowed Rs2000 at 5% annual simple interest repayable in 3 equal annual installments. What will be the annual installment?

a) Rs $730\frac{10}{63}$ b) Rs $840\frac{9}{61}$ c) Rs $640\frac{11}{63}$ d) Rs $250\frac{10}{63}$

Q57. A person lent Rs 23000 to B for 3 years and Rs 19000 to C for 4 years at the same rate of interest at SI and received a total of Rs 3625 as interest from both. What is the annual rate of interest?

a) 1.5% b) 3% c) 2.5% d) 4%

CGL MAINS 2022

Q58 The difference of simple interest from two banks on 8,000 in 3 years is Rs 800. If the rate of interest per annum in two banks are RI and R2, then what is the value of RI - R2? (Where RI > R2)

a) $5\frac{1}{3}\%$ b) $2\frac{1}{3}\%$ c) $3\frac{1}{3}\%$ d) $1\frac{1}{3}\%$

CHSL PRE 2022

Q59 1/2 of a certain sum is lent at 20 percent rate of interest. 2/5 of the remaining sum is lent at 25 percent rate of interest. The remaining sum is lent at 10 percent rate of interest. If the simple interest received on the total sum for 2 years is Rs 360, then what is the sum?

a) Rs 1000 b) Rs 1400 c) Rs 1200 4) Rs 800

Q60 The difference between simple interest on a certain sum at the annual rate of 8 percent for 5 years and 6 years is Rs 26. What is the sum?

a) Rs 325 b) Rs 360 c) Rs 240 d) Rs 290

Q61 A sum of Rs 4000 becomes Rs 4960 in 4 years at simple interest. If the rate of interest becomes 1.5 times of itself, then how much this sum will become after 4 years?

a) Rs 5280 b) Rs 4890 c) Rs 5440 d) Rs 5680

Q62 A person invested a total sum of Rs 15500 in three different schemes of simple interest at the annual rate of 4 percent, 6 percent and 10 percent. At the end of one year he got same interest in all three schemes. What is the sum invested at the rate of 6 percent?

a) Rs 5400 b) Rs 5000 c) Rs 6500 d) Rs 5500

ICAR & SELECTION PHASE XI

Q63 P borrows Rs 5,00,000 from the bank which charges 18% simple interest per annum at the start of the year. He pays 11 equal monthly instalments of Rs 40,000 and his bike at the end of the year to pay the amount. What is the value of the bike given?

1. 1,50,000 2. 1,10,000 3. 1,75,000 4. 1,25,000

Q64 To buy a car, Sahil borrowed some amount at 10% simple interest rate. He has paid some loan amount but Rs 1,81,500 is due which he has to pay in 3 years. What will be the annual installment (in Rs)?

1. 55,000 2. 47,000 3. 65,000 4. 54,500

Q65 Ravi borrowed Rs 1380 from a bank which he repaid in 6 years at the rate of 6% per annum simple interest. If payment was made in six equal instalment, then each instalment was:

1. Rs 220 2. Rs 200 3. Rs 190 4. Rs 180

Q66 What annual payment (in Rs) will discharge a debt of Rs 1500 in 10 years at 5% per annum simple interest ?(Correct to two decimal places)

1. 111.44 2. 122.44 3. 125.44 4. 123.44

Q67 A man borrowed some money from a private organization at 5% simple interest per annum. He lent this money to another person at 10% compound interest per annum and made a profit of Rs 26,410 in 4 years. The man borrowed?

1. Rs 200000 2. Rs 132050 3. Rs 150000 4. Rs 100000

Q68 The simple interest on Rs 2460 will be Rs 162 less than the simple interest on Rs 3000 at the rate of 5% per annum simple interest. Find the time taken in years.

1. 4 2. 6 3. 3 4. 5

Q69 What is the annual payment Sunil should pay (in Rs) to clear his debt of Rs 15,750, which he borrowed from his cousin and promised to return in 3 years at 5% simple interest?

1. 4800 2. 2500 3. 4850 4. 5000

CGL PRE 23

Q70 If the amount received in 3 years on an amount of ₹ 72 is ₹ 104.4, then what will be the amount received in 5 years on an amount of ₹ 120 at the same rate per annum?

1. Rs 330 2. Rs 450 3. Rs 215 4. Rs 210

Q71 A person deposited ₹500 for 3 years, ₹650 for 5 years and ₹1,250 for 7 years. He received a total of ₹ 1,620 as simple interest. Find the annual interest rate.

1. 11% 2. 12% 3. 10.8% 4. 13%

Q72 If the amount received in seven years at a certain rate of simple interest per annum is ₹ 14, 522 and the amount received in 11 years is ₹ 18,906, then find the amount (in ₹) invested.

1. 6850 2. 6800 3. 6900 4. 6750

Q73 A person took a loan at 5% per annum simple interest during the first year and with an increase of 0.5% simple interest every year from the second year onwards. After 4 years, he paid Rs4,600 as a total interest to settle the loan completely. How much was the loan?

1. Rs 20,000 2. Rs 19,000 3. Rs 18,000 4. Rs 21,000

Q74 Archana took a loan of Rs 78,000 from a bank on 24th January 2012 at $8\frac{3}{4}\%$ per annum simple interest and paid it back on 18th June 2012. Find the total amount paid by Archana. (Approximated to nearest integer)

1. Rs 80,723 2. Rs 90,730 3. Rs 85,733 4. Rs 88,730

CHSL PRE 23

Q75. In 't' years, the simple interest earned on a certain amount at the rate of 10% per annum is 5/8th of the principal

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amount. If the rate of interest is made three-fourth of 10% and the simple interest remains the same, which of the following statements is true about the changed value of time?
1. It remains the same as 't'.
2. It becomes three-fourth of the time 't'.
3. It increases to $8\frac{1}{3}$ years. 4. it decreases to $5\frac{1}{2}$ years.

Q76. A money-lender claims he lends money at a simple rate of interest of 8% per annum. But he cleverly includes the interest amount in the principal when he calculates it every six months. The effective rate of interest becomes.
1. 8.2% 2. 8.16% 3. 8.8% 4. 8.25%

Q77. A man borrows Rs 4000 from a bank at 10% per annum simple interest and clears the debt in three years. If the installments paid at the end of the first, and second years to clear the debt are Rs 1500 and 2500, respectively, what amount (in Rs) should be paid at the end of the third year to clear the debt?
1. 500 2. 550 3. 650 4. 700

Q78. Ashima borrowed Rs 75,000 from a nationalized bank on 26th March 2022 at the rate of 9% per annum simple interest. If she cleared the account on 7th June of the same year, then what amount did she pay?
1. Rs 1,350 2. Rs 75,350 3. Rs 76,350 4. Rs 75000

Q79. A man deposited Rs 10,000 at simple interest in a fund. The interest rate on the fund increases by 4% every year. If the interest rate at the time of the amount deposit was 8%, what is the interest earned (in Rs) by him after 5 years?
1. 8,000 2. 8,400 3. 5,800 4. 6,000

Q80. If a sum of money becomes Rs 6,000 in 3 years and Rs 10,500, in 7 years and 6 months at the same rate of simple interest, then what is the rate of interest?
1. $33\frac{1}{3}\%$ 2. $66\frac{1}{3}\%$ 3. $25\frac{1}{2}\%$ 4. $45\frac{2}{3}\%$

Q81. Simple interest on a certain sum is one-fourth of the sum and the interest rate per annum is four times the number of years. If the rate of interest increases by 2%, then how much will the simple interest (in Rs) be on Rs 3,600 for 6 years?
1. 2642 2. 2514 3. 2592 4. 2562

SELECTION PHASE XII

Q82. What equal instalment of annual payment (in ₹) will discharge a debt that is due as ₹624 at the end of 5 years at 2% per annum simple interest?
a) 120 b) 150 c) 180 d) 240

Q83. ₹50,000 is deposited in a bank account. There was already some money in the account. Now the bank gives ₹7,500 as simple interest in a year. The rate of simple interest is 4.5% per annum. How much money (in ₹) was already there in the account?
a) 1,66,666.67 b) 1,16,666.6 c) 1,13,333.33 d) 1,33,333.33

Q84. Rohan buys a bike priced at ₹95,000. He pays ₹25,000 at once and the rest after 18 months, on which he is charged a simple interest at the rate of 10% per annum. The total amount (in ₹) he pays for the bike is:
a) 1,23,200 b) 1,05,500 c) 1,03,500 d) 1,02,320

Q85. What annual instalment will discharge a debt of Rs.3,658 due in four years at 12% simple interest per annum?
a) Rs.725 b) Rs.825 c) Rs.750 d) Rs.775

Q86. A man has to discharge a debt of ₹15,600 which is due in 3 years at 4% simple interest per annum. If he pays this amount in equal instalments of annual payment, find the amount for annual payment.
a) ₹5,100 b) ₹5,000 c) ₹5,400 d) ₹5,200

Q87. The annual instalment (in ₹) to discharge a debt of ₹8,432 due in 4 years at 16% simple interest per annum is:
a) 2,204 b) 1,527 c) 2,108 d) 1,700

Q88. An annual instalment of ₹3,500 will discharge a debt of ₹16,310 due in 4 years at y% simple interest per annum. What is the value of y? [Note: Instalments will be paid at the end of Year 1, Year 2, Year 3 and Year 4.
a) 10.5 b) 16.5 c) 11.5 d) 11

Q90. ₹1,380 has to be paid after 4 years. If four equal instalments are required with a simple interest of 10% on each instalment, then what is the value of each instalment?
a) ₹500 b) ₹200 c) ₹400 d) ₹300

Q91. Sanjana borrows ₹16,000 at24% per annum simple interest and Savithri borrows ₹18,200 at 20% per annum simple interest. In how many years will their amounts of debts be equal?
a) 10 b) 15 c) 12 d) 11

Q92. Mr Gogia invested an amount of ₹,13,900 divided into two different schemes A and B at the simple interest rate of 14% pa and 11% pa, respectively. If the total amount of simple interest earned in 2 years is ₹3,508, what was the amount invested in scheme B?
a) ₹7,200 b) ₹7,500 c) ₹6,400 d) ₹6,500

Q93. The amount of debt that will be discharged by 5 equal monthly instalments of ₹1,845 each, at the rate of 48% simple interest per annum, is:
a) ₹9,468 b) ₹9,048 c) ₹9,048 d) ₹9,963

CPO 2024

Q95. What annual instalment will discharge a debt of ₹10,192 due in 3 years at 10% simple interest?
a) Rs3,144.48 b) Rs3,044.48 c) Rs3,088.48 d) Rs3,188.48

Q96. A certain sum of money is given at a certain rate of simple interest for 4 years. Had it been given at 11% higher

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rate for the same time, it would have fetched ₹1320 more. Find the sum (in ₹).

a) 2500 b) 3000 c) 4580 d) 3240

Q97. If the simple interest on a certain sum of money for 20 months at the rate of 19.2% per annum exceeds the simple interest on the same sum for 15 months at the rate of 11.2% p.a. by ₹2,920, then what is the sum (in ₹, to the nearest hundreds)?

a) 16,620 b) 12,660 c) 16,200 d) 16,660

Q98. A part of ₹48,500 is invested at a simple interest of 15% per annum. The rest of the money is invested at the rate of 10% simple interest per annum after 2 years of the first investment. The ratio of interest after 5 years from the time when the first amount was invested is 5 : 3. How much is the second part that was invested(in ₹) at the rate of 10% simple interest?

a) 20,940 b) 29,100 c) 24,900 d) 19,400

CHSL 2024

Q99. A clock is sold for ₹550 cash or in the instalment scheme, for ₹250 cash down payment and ₹310 after one month. Find the rate of interest charged in the instalment scheme.

a) 40% b) 20% c) 35% d) 45%

Q100. A bank charges simple interest for Rs K at the rate of $r^{\frac{1}{2}}$ for n^2 years. Another bank charges simple interest for Rs L at the rate of $r^{\frac{3}{2}}$ for n^3 years and gives the same interest. The ratio between K and L is:

a) $\frac{1}{r} : \frac{1}{n}$ b) r n : 1 c) $r^2 : n^2$ d) $r^{\frac{1}{2}} : n^{\frac{1}{2}}$

Q101. Find the total amount of debt that will be discharged by 5 equal instalments of Rs200 each, if the debt is due in 5 years at 5% p.a. at simple interest.

a) Rs1400 b) Rs1100 c) Rs1200 d) Rs1255

Q102. Rahna decided to buy a scooty that costs ₹40,000. The shopkeeper agreed to sell the scooty under the condition of ₹25,000 cash down payment of ₹4,000 each month for four months. Find the rate of interest at which the shopkeeper sold the scooty under the instalment scheme.

a) 33% b) $10\frac{1}{3}\%$ c) $18\frac{1}{2}\%$ d) $16\frac{1}{2}\%$

Q103. Reshma took a loan of ₹12,00,000 with simple interest for as many years as the rate of interest. If she paid ₹9,72,000 as interest at the end of the loan period, what was the rate of interest per annum ?

a) 7.5% b) 8% c) 8.7% d) 9%

CGL 2024

Q104. Sohan borrows a sum of Rs 1,41,545 at the rate of 11% per annum simple interest. At the end of the first year, he repays Rs 25,490 towards return of principal amount borrowed. If Sohan clears all pending dues at the end of the second year, including interest payment that accrued during the first year, how much does he pay (in Rs) at the end of the second year?

a) 1,34,407 b) 1,41,222 c) 1,36,453 d) 1,44,391

Q105. What annual instalment will discharge a debt of Rs26,160 due in 4 years at 6% simple interest p.a?

a) 4500 b) 5500 c) 6000 d) 5800

Q106. A trader owes a merchant Rs 9,810 due in 1 year, but the trader wants to settle the account after 6 months. If the rate of simple interest is 9% per annum, how much cash (in Rs) should he pay?

a) 9,550 b) 9,450 c) 9,540 d) 9,405

Q107. A sum of Rs 10,000 is taken as a loan by Rajesh at a rate of 15% p.a. simple interest for 2 years. But Rajesh could not repay it at the agreed time and asked for an extension of two more years. So, the lender included the interest amount for the period as principal for the next two years at the same rate of interest. The total amount paid by Rajesh at the end of 4 years is:

a) Rs18,590 b) Rs16,900 c) R17,650 d) Rs15,630

Q108. A certain sum of money becomes seven times itself when invested at a certain rate of simple interest, in 14 years. How much time (in years, rounded off to 2 decimal places) will it take to become 18 times itself at the same rate?

a) 35.5 b) 42.78 c) 39.67 d) 27.33

Q109. A customer pays Rs 975 in instalments. The payment is done each month Rs 5 less than the previous month. If the first instalment is Rs 100, how much time will be taken to pay the entire amount?

a) 14 months b) 15 months
c) 27 months d) 26 months

Q110. A certain sum of money is given at a certain rate of simple interest for 6 years. Had it been given at 7% higher rate, it would have fetched Rs 1,512 more. Find the sum (in Rs).

a) 3,200 b) 3,600 c) 3,100 d) 4,200

Q111. A total of Rs 2,00,000 is divided into two parts for investing in different banks on simple interest. One yields 4% p.a. while the other yields 6% p.a. if the total interest at the end of one year is equivalent to 4.7% p.a. on the whole amount, the amount (in Rs) invested in each bank is _____ respectively.

a) 1,30,000 and 70,000 b) 1,45,000 and 55,000
c) 1,20,000 and 40,000 d) 1,60,000 and 40,000

Q112. Ramu lent ₹3,000 to Raju and certain sum to Ravi at the same time and at the same rate of simple interest of 8% per annum. After 5 years, he received a sum of ₹1,600 from Raju and Ravi together as interest. Find the sum lent to Ravi.

a) ₹1,250 b) ₹1,500 c) ₹1,200 d) ₹1,000

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ANSWERS

1	B	2	B	3	C
4	A	5	D	6	B
7	D	8	B	9	B
10	A	11	A	12	C
13	C	14	B	15	D
16	B	17	C	18	B
19	B	20	D	21	A
22	D	23	B	24	A
25	B	26	A	27	A
28	D	29	D	30	A
31	A	32	C	33	A
34	D	35	C	36	A
37	A	38	A	39	A
40	C	41	B	42	D
43	C	44	C	45	D
46	C	47	A	48	D
49	B	50	A	51	C
52	B	53	D	54	D
55	C	56	A	57	C
58	C	59	A	60	A
61	C	62	B	63	A
64	A	65	B	66	B
67	D	68	B	69	D
70	D	71	B	72	A
73	A	74	A	75	C
76	B	77	C	78	C
79	A	80	A	81	C
82	A	83	B	84	B
85	D	86	B	87	D
88	D	89		90	D
91	D	92	C	93	D
94		95	C	96	B
97	C	98	B	99	A
100	B	101	B	102	A
103	D	104	D	105	C
106	D	107	B	108	C
109	B	110	B	111	A
112	D				

STUDENT MUDDF

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1.

Time → 5 : 3 — 2 yr SI = 1

Amount → 5 : 4 — 3 yr SI = 3/2

P = 4 − 3/2 = 5/2

$R\% = \frac{1/2}{5/2} \times 100 = 20\%$ Ans

2.

SI : P

100 : 100

Rt = 100 = 10 × 10

time = 10 years Ans

3.

$\frac{80}{1500} \times 100 = \frac{x}{12} \times \frac{x}{9}$

$x = 24$ Ans

4.

$\frac{225}{1000 \times 3} \times 35500 \times \frac{13}{5} = 6922.5$

5.

11046 − 8400 = 2646

int. ⇒ $\frac{2646}{8400} \times 9600 = 3024$ Ans

6.

$A \times \frac{21}{5} \times \frac{20}{3} = B \times \frac{11}{4} \times 4 \times 2$

$\frac{A}{B} = \frac{33}{42}$

Difference = $\frac{5000}{75} \times 9 = 600$ Ans

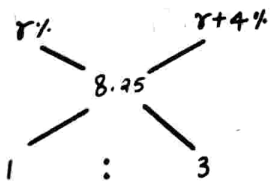
7.

$\frac{14395.20}{100 + (5.4 \times 9.25)} \times 4.5 \times 8.6$

= 3715.20 Ans

8.

METHOD-1



r+4% = 9.25%

Overall Rate% =

$\frac{4125}{2 \times 25000} \times 100 = 8.25\%$

METHOD-2

$\frac{4125 - 18750 \times \frac{8}{100}}{25000 \times 2} \times 100 + 4 = 9.25\%$

9.

$2000 \times \frac{104}{100} = 2080$ Ans

10.

$3000 + 3000 \times \frac{15}{12} \times \frac{8}{100} = 3300$ Ans

11.

M-1

Rate → 12%, 10%

↓

(10+2)%

2 yr Interest ⇒ 3344

1 yr Interest ⇒ 1672

15000 × 10% = 1500

now, 1672 − 1500 = 172

2% → 172

100% → 8600

↓

money invested on 12%

Money invested on 10%

⇒ 15000 − 8600

⇒ 6400 Ans

M-2

$\frac{3344 - \frac{15000 \times 10 \times 2}{100}}{(12-10) \times 2} \times 100$

⇒ 8600 (Money at 12%)

Money at 10%

⇒ 15000 − 8600 = 6400

12.

Total interest at 8% Rate for 2 years = 16%

Amount → 116%

Sum → $\frac{191864}{116} \times 100 = 1,65,400$

13.

$\frac{100}{50} \times 12 = 24\%$ Ans

14.

$\frac{x}{100} \times \frac{x}{3} = \frac{1}{3}$

$x = 10$ Ans

15.

$35000 \times \frac{18}{7} \times \frac{9}{12 \times 100} = 675$ Ans

16.

$x \times 6 \times 2 = y \times 9 \times 3 \times 2$

$x = 4.5y$ Ans

17. Method 1

Overall rate = $\frac{23110.50}{186 \times 3 \times 3.5} \times 100$

$= \frac{35.5}{3}$

x% : (x+2)%

1 : 2

Now, $\frac{x + 2x + 4}{3} = \frac{35.5}{3}$

$x = 10.5\%$

Rate at second investment

R+2 → 12.5% Ans

METHOD → 2

Net % = $\frac{23110.5 \times 100}{18600 \times 3 \times \frac{7}{2}} = \frac{71}{6}$

⇒ $\frac{x+4}{3} = \frac{71}{6}\%$; $x = \frac{71-8}{6} = 10.5\%$

(x+2)% → 12.5% Ans

18.

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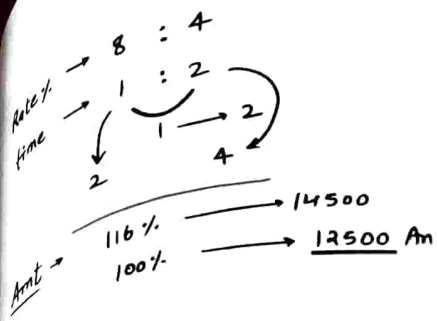
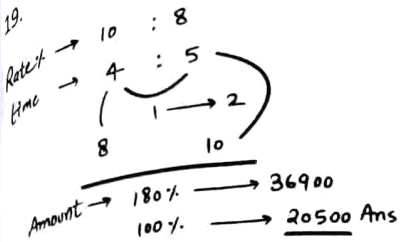


19.



20.

$$\frac{2800}{12\times12000 + 8\times6000\times2}\times100\times12$$

$$\frac{280}{20} = 14\%\ \text{Ans}$$

21.

$$\frac{x\times R\times3}{100} + \frac{2x\times x\times(R-2)}{100} = 13600$$

$$\frac{13xR}{100} - \frac{20x}{100} = 13600$$

$$\frac{x\times R\times 34}{100\times 3} = 13600, \quad \frac{xR}{100} = 1200$$

$$13\times1200 - \frac{20x}{100} = 13600$$

$x = 10000$ Ans

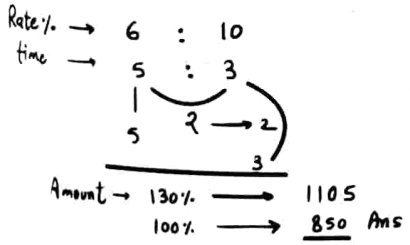
22.

$a\times3 = b\times4 = c\times6$

$a : b : c = 4 : 3 : 2$

$$\frac{9000}{9}\times2 = 2000\ \text{Ans}$$

23.



24.

2yr SI → 10560

3yr SI → 15840

$P = 81840 - 15840 = 66000$

$$\text{Rate} = \frac{10,560}{66000}\times\frac{100}{2} = 8\%$$

at $(x+2)\%$ → $10\%\times10 = 100$

Time = 10 Ans

25.

METHOD → 1

Rate → 9% 7%
↓
(7+2)%

3 year Interest → 5832
1 year Interest → 1944

Interest at 7%
⇒ $25600\times7\% = 1792$

Interest Left → $1944 - 1792 = 152$

2% → 152
100% → 7600 (at 9% Interest)

METHOD – 2

$$\frac{5832 - 25600\times\frac{7}{100}\times3}{3\times2\%}\times100 = 7600$$

26.

3yr SI → $7563.2 - 6240.8 = 1322.4$

1 yr SI → $\frac{1322.4}{3} = 440.8$

$P = 6240.8 - 440.8 = 5800$

$$\text{Rate\%} = \frac{440.8}{5800}\times100 = 7.6\%\ \text{Ans}$$

27.

$1\frac{1}{2}$ yr SI $= 10849 - 9766 = 1083$

$$P = 9766 - \frac{1083}{3/2}\times3 = 7600$$

$$\text{Rate} = \frac{1083}{7600\times\frac{3}{2}}\times100 = 9.5\%$$

28.

$A\times3\times5 = B\times4\times5 = C\times5\times5$

$A : B : C = 20 : 15 : 12$

$$= \frac{105750}{47}\times12 = 27,000\ \text{Ans}$$

29.

$$5008 + 4000\times\frac{3\times2.6}{100} = 5320\ \text{Ans}$$

30.

$3\frac{1}{2}$ yr SI $= 10527 - 8563.5$
$= 1963.5$

$P = 8563.5 - 1963.5 = 6600$

$$\text{Rate\%} = \frac{1963.5}{6600\times\frac{7}{2}}\times100 = 8.5\%\ \text{Ans}$$

31.

METHOD → 1

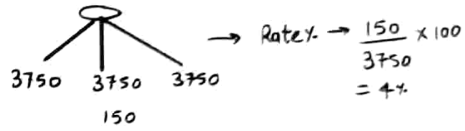
$$r = \frac{7650}{\frac{11,250}{3}}\times100 = 204\%$$

Rate = 4% Ans

METHOD 2

3yr SI → 11250

1 yr SI/CI → 3750



P → $\frac{3750}{4}\times100 = 93,750$ Ans

32.

$$\text{Rate} = \frac{50}{8}\%$$

$$\frac{7200}{100}\times\frac{50}{8}\times\frac{17}{3} = 2550\ \text{Ans}$$

33.

2 year SI = 6400

$$P = 49600 - \frac{6400}{2}\times3 = 40,000$$

$$\text{Rate} \rightarrow \frac{6400}{40,000}\times\frac{100}{2} = 8\%$$

R+2 → 10%, Sum → 100%
10% × 10 yr

time = 10yr Ans

34.

$$\frac{4T\times T}{100} = \frac{1}{4} \Rightarrow T = \frac{10}{4}, \quad 4t = 10\%$$

$$\text{Required Interest} = 5000\times\frac{12\times3}{100} = 1800\ \text{Ans}$$

35.

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METHOD-2

$$\frac{3008 - 17200 \times \frac{16}{100}}{2\% \times 2} \times 100 = 6400$$

at 8% Rate = 17200 − 6400 = 10,800

Method 1

2 years interest → 3008

1 year interest → 1504

Rate% → 10% 8%

↓

(8+2)%

interest at 8%

= 17200 × 8% = 1376

interest left = 1504 − 1376 = 128

Now, 2% ——— 128

100% ——— 6400 (At 10% Rate)

At 8% Rate → 17200 − 6400 = 10800 Ans

36.

3 yr SI = 1400

1 yr SI = $\frac{1400}{3}$

5 yr SI = $\frac{1400}{3} \times 5$

$$P = 4600 - \frac{1400 \times 5}{3} = \frac{6800}{3}$$

$$\frac{1400/3}{6800/3} \times 8500 \times \frac{13}{2} = 11,375$$

37.

$$\frac{75}{6000} \times \frac{100}{6.25} \times 365 = 73 \text{ days}$$

= 15th March 2019 Ans

38.

$$\frac{6\%}{762} \times 15748 = 124$$

So $R = \frac{24}{3} = 8\%$ Ans

39.

2 yr SI → 292

7 yr SI → $\frac{292}{2} \times 7$

$$P = 3942 - \frac{292}{2} \times 7 = 2920$$

$$\text{Rate\%} = \frac{292}{2 \times 2920} \times 100 = 5\%$$ Ans

40.

6500 : 7500

13 : 15

x% x−2%

Net = $x - \frac{15 \times 2}{28}$

= $\left(x - \frac{15}{14}\right)\%$

$$\left(x - \frac{15}{14}\right)\% = \frac{3750}{(6500+7500) \times 3} \times 100$$

= $\frac{125}{14}$ %

x = 10% Ans

41.

$R = \frac{R}{12}\%$

= $\frac{25\%}{12} = \frac{1}{48}$

1 Y — 48

2nd — 49

3rd — 50

4th — 51

198

198 — (25000 − 5200)

1 — 19800/198

48 — 4800

$4800 \times \left(1 + \frac{25\%}{8}\right)$

$4800 \times \frac{13}{12} = 5200$

42.

100

100 + 9

100 + 18

Total = 327 — 3270

100 — 1000

43.

S.I

$A = nI + \frac{I \times R}{100}$

$= (25000 - 2500) + \frac{22500 \times 24}{100}$

$= 4I + I \times \frac{24}{12 \times 100}$

24300 = 4I + 0.12I

$I = \frac{24300}{4.12} \approx 5900$

44.

5% 7%

$\frac{276 \times 100}{9 \times 2500}$

$\frac{138}{25}$

37 : 13

50R = 2500

R = 50

13R = 650

45.

Day = 190

$I = \frac{7300 \times 15 \times 190}{100 \times 365}$

= 570

46.

A	B	C
$\frac{1}{25}$	$\frac{1}{20}$	$\frac{2}{25}$

4A = 5B = 8C

A : B : C = 10 : 8 : 5

$\frac{8}{23} \times 57500$

= 20000

47.

CI − SI = $0.38^2 \times 3$

0.4864

$15625 \times \frac{0.4864}{100}$

= 76

48.

$45000 - \frac{2 \times 45000}{100}$

$= 44100 \times \frac{98}{100}$

= 43218

49.

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$3 = \frac{1 \times 50 \times t}{100}$

$t = 6$

more than 4 times

$t = 6+1 = 7y.$

50.

$7500 - 3500 = 4000$

$R = \frac{9}{12} \times 4 = 3\%$

$\frac{4000 \times 3}{100} = 120.$

51.

100
100 +12
100 +24
100 + 36

Total = 472 — 5664

100 — $\frac{5664}{472} \times 100$

= 1200

52.

4% : 5%

$\frac{229}{5000} \times 100 = 4.46$

.46

.54

27 : 23 $\frac{5000 \times 27}{50} = 2700$

53.

100
100+10
100+20
100+30
100+40

600 — 9600

100 — 1600

54.

5P — per ₹ 1/m

40P — per ₹ 18 m

$\frac{2700 \times 8 \times 5}{100} = 1080$

55.

$P = \frac{4P \times 3 \times 6}{100}$

$r = \frac{25}{3}$

$P + \frac{P \times 7 \times 25}{3 \times 100} = 760k$

$\frac{19P}{12} = 760k$

$P = 480000$

56.

100
100 +5
100 +10

315 — $2000 \times \frac{115}{100}$

100 — $\frac{2000 \times 23 \times 100}{20 \times 315}$

$= \frac{46000}{63}$

$= 730\frac{10}{63}$

57.

$\frac{23000 \times R \times 3}{100} + \frac{19000 \times R \times 4}{100}$

$\Rightarrow 3625$

$R \Rightarrow 2.5\%$

58.

$\frac{8000 \times 3 \times R_1}{100} - \frac{8000 \times 3 \times R_2}{1000}$

$= 800$

$R_1 - R_2 = \frac{800}{80 \times 3}$

$= \frac{10}{3}$

$= 3\frac{1}{3}\%$

59.

Let amount = 100x

$\frac{1}{2}$ at 20%, $\frac{2}{5}$ at 25%,

Rest at 10%

$50 \times 20\% + 20 \times 25\% + 30 \times 10\%$

$\Rightarrow 10 + 5 + 3$

$18x \times 2 = 360$

$x \Rightarrow 10$

$100x \Rightarrow 1000$

60.

$(8 \times 6 - 5 \times 8)x \longrightarrow 96$

$\cancel{7x} \longrightarrow \cancel{96}$

$x = 13/4$

$100x = \frac{13 \times 100}{4}$

= 325

61.

4000 —— 4960

960 —— in 4 years

240 —— in 1 year

R% = 6%.

Now Int % becomes = $6 \times \frac{3}{2} = 9\%$

New Int = $\frac{4000 \times 9 \times 4}{100} = 1440$

Amt = 1440 + 4000

= 5440

62.

$4A = 6B = 10C$

$\frac{A}{B} = \frac{3}{2}$, $\frac{C}{B} = \frac{3}{5} \times 2$

A : B : C

$\Rightarrow 15 : 10 : 6$

$\Rightarrow 31 \rightarrow 15500$

$B \Rightarrow \frac{15500 \times 10}{31}$

$\Rightarrow 5000$

63.

$5L \times \frac{118}{100} = 590000$

$11 \times 40,000 = 440000$

Bike = 590000 - 440000

= 150000

64.

100 + 20
100 + 10
100 + 0

330 — 181500

1 — 550

100 — 55000

65.

100 + 6
100 + 12
100 + 18
100 + 24
100 + 30
100 + 0

690 ⟶ 1380

100 ⟶ 200

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66.

$100+5$
$100+10$
$\vdots$
$10y$

$1000+5(1+2\cdots 9)$
$1000+5\times45$
$1225 \longrightarrow 1500$
$100 \longrightarrow 122.44$

67.

$\frac{P\times46.41}{100}-\frac{P\times20}{100}=26410$

$\frac{P\times26.41}{10000}=26410$ (10% → 46.41, 4 years)

$P=100000$

68.

$\frac{3000\times5\times t}{100}-\frac{2460\times5\times t}{100}=162$

$27t=162$
$t=6$

69.

Let annual pay = 100

100	
100	5
100	10
300	15

$315 \longrightarrow 15750$
$100 \longrightarrow 5000$

70.

$A=104.4$
$P=72$
$I=32.4$
$R=\frac{100\times32.4}{72\times3}=15\%$
$I=\frac{5\times120\times15}{100}=90$
$A=120+90=210$

71.

$\frac{3\times500\times R}{100}+\frac{5\times650\times R}{100}+\frac{1250\times7R}{100}$

$15R+\frac{65R}{2}+\frac{175R}{2}=1620$

$R=\frac{1620}{135}=12\%$

72.

$11y \longrightarrow 18906$
$7y \longrightarrow 14522$
$4y \longrightarrow 4384$
$1y \longrightarrow 1096$
$7y \longrightarrow 7672$
$P=14522-7672$
$=6850$

73.

I	II	III	IV
5%	5.5%	6%	6.5%

Total = 23%

$\Rightarrow \frac{4600\times100}{23}$
$=20{,}000$

74.

Time 24 Jan to June 18
$\approx$ 5 month

$=78000+78000\times\frac{5}{12}\times\frac{35}{400}$

$=78000+2843.75$
≈ 80843.75
≈ 80723

75.

$5=\frac{8\times10\times t}{100}$
$t=\frac{25}{4}$

$5=\frac{8\times3\times10\times t}{4\times100}$
$t=\frac{25}{3}$

R increases $= 8\frac{1}{3}$

76.

$x=4\%$
$4+4+\frac{4\times4}{100}=8.16\%$

77.

$x=[4000+2500+0]\times\frac{1}{10}$
$=650$

78.

Total Day $=5+30+31+7=73$
$75000\times\frac{9}{100}\times\frac{73}{365}=1350$
$75000+1350=76350$

79.

8, 12, 16, 20, 24 $\Rightarrow$ 80%
$10000\times\frac{80}{100}=8000$

80.

$3y \longrightarrow 6000$
$7.5y \longrightarrow 10500$
$4.5y \longrightarrow 4500$
$1y \longrightarrow 1000$
$3y \longrightarrow 3000$
Sum $=6000+3000$
$=3000$
$r\% = \frac{1000\times100}{3000}$
$=33.33\%$

81.

$\frac{P\times4t\times t}{100}=\frac{P}{4}$
$t=\frac{5}{2}$, $r=10\%$
$S.I=\frac{3600\times12\times6}{100}$
$=2592.$

82.

100
102
104
106
108
520

$\frac{624}{520}\times100=120$

83.

$\frac{50000\times4.5}{100}=2250$
$7500-2250=5250$
Extra.
$\frac{5250}{4.5}\times100=116666.7$

84.

$P=95000$
Rem $=95000-25000$
$=70000$
$S.I=70000\times\frac{18}{12}\times\frac{10}{100}$
$=10500$

85.

100	36
100	24
100	12
100	
472	3658

$100 \longrightarrow \frac{3658}{472}\times100$
$=775$

86.

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25
25
25 1
2
178 —— 15600
95 —— 5000

87.

25
25 4
25 8
25 12
124 —— 8432
95 —— 1700

88.

$\frac{2310}{35 \times 6} = 11.$

89.

No question.

90.

100 10
100 20
100 30
460 —— 1380
100 —— 300

91.

$16000\left(1+\frac{24t}{100}\right)=18200\left(1+\frac{20t}{100}\right)$

$2200 = 3840t - 3640t$

$t = 11.$

92.

S.I 1 year $= \frac{3508}{2}$
$= 1754$

11% → SI = 11 × 139 = 1529
3% — 1754 − 1529
= 225

A's $= \frac{225}{3} \times 100 = 7500$

B's = 13900 − 7500
= 6400

93.

100 16
100 12
100 8
100 4
100
540

$\frac{1845 \times 540}{100}$
= 9963

94.

NO QUESTION

95.

100 2×10
100 1×10
100
330 —— 10192
100 —— 3088·48

96.

$(8\% + 11\% - 8\%) \times 4 = 1320$
$44\% = 1320$
$100\% = 3000$

97.

$\frac{19.2}{12} \times 100 = 32$
$\frac{11.2}{2} \times 15 = 14$) 18
18 — 2920
100 — 16222.2

98.

$\frac{A \times 15 \times 5}{B \times 10 \times 3} = \frac{5}{3}$

$\frac{A}{B} = \frac{2}{3}$

$\Rightarrow \frac{3}{5} \times 48500$
$\Rightarrow 3 \times 9700$
$\Rightarrow 29100$

99.

550 : 250 : 310
55 − 25 = 30 — Remain to Pay
SI = $\frac{P \times R \times T}{100}$
$31 - 30 = \frac{30 \times R \times 1}{100 \times 12}$
R = 40%

100.

$k \times x^{1/2} \times m^2 = L \times x^{3/2} \times m^3$
$\frac{K}{L} = \frac{xm}{1}$

101.

100
105
110
115
120
550

$\frac{200 \times 550}{100}$
$= 1100.$

102.

40,000 − 25000 = 15000
Int = 4000 × 4 − 15000
= 1000
P = 15000 + 11000 + 7000 + 3000
= 36000
SI = $\frac{P \times R \times T}{100}$
$1000 = \frac{36000 \times R \times 1}{12 \times 100}$
R = 33%

103.

$1200000 \times \frac{R \times 1}{100} = 972000$
R = 9%

104.

$\frac{141545 \times 11}{100} = 15569.95$
141545 − 25490 = 116055
$\frac{116055 \times 11}{100} = 12766.05$
116055 + 15569.95 + 12766.05
= 144391

105.

100 436 — 26160
106 100 — $\frac{26160 \times 100}{436}$
112
118
436 = 6000

106.

$\frac{9810}{109} \times 100 = 9000$
$9000 \times 104.5\% = 9405$
(6 months)

107.

$\frac{10000 \times 15 \times 2}{100} = 3000$
10000 + 3000 = 13000
after 2 y.
$\frac{13000 \times 15 \times 2}{100} = 3900$
13000 + 3900 = 16900

108.

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5 to 6:30 = 1.5h

60 min — 5+2 = 7 Round
30 min — 3.5 Round

Total = 7+3 = 10

14Y — 6 interest
T — 17 interest

$\frac{T \times 6}{1400} = 17$

T = 39.67 y.

109.

a = 100
d = -5

$975 = \frac{n}{2}[200 + (n-1)(-5)]$

$975 = \frac{n}{2}[205 - 5n]$

$390 = n(41 - n)$

15 26

n = 15

110.

7% +

7×6 = 42
42 — 1152
100 — $\frac{1152 \times 100}{42}$
= 3600

111.

4 6
4.7
1.3 .7

2 → 200000
1.7 — 130000
.7 — 70000

112.

Ramu
8% 8%
Raju Ravi
3000 x

Principal × 8% = $\frac{16000}{5}$

Principal = 4000 − 3000
= 1000

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COMPOUND INTEREST

CGL PRE 2018

Q.1 A sum of ₹15,000 is lent at 16% per annum compound interest. What is the difference between the compound interest for the second year and the third year?
(a)₹544 (b)₹445.44 (c)₹454.88 (d)₹548

Q.2 A person borrowed a certain sum at 10% per annum for three years, interest being compounded annually. At the end of two years, he repaid a sum of ₹6634 and at the end of the third year, he cleared off the debt by paying ₹13,200. What was the sum borrowed by him?
(a)₹16,400 (b)₹15,400 (c)₹15,600 (d)₹16,500

Q.3 A sum of ₹x was borrowed and paid back in two equal yearly instalments, each of ₹35,280. If the rate of interest was 5% compound annually, then the value of x is:
(a)64,800 (b)65,600 (c)65,400 (d)64,400

Q.4 A sum of ₹12,000 amounts to ₹20,736 in 3 years at a certain rate percent per annum, interest compound annually. What will the amount of the same sum be in 2 years at the same rate on compound interest?
(a)₹17,280 (b)₹17,820 (c)₹14,520 (d)₹15,640

Q.5 ₹60000 invested at a certain rate for a certain even number of years, compounded annually, grows to ₹63,654. To how much amount would it grow if it is invested at the same rate for half period?
(a)₹61800 (b)₹61809 (c)₹61675 (d)₹61827

CHSL PRE 2018

Q.6 A sum invested at 8% per annum amounts to ₹20280 at the end of one year, when the interest is compound half yearly. What will be the simple interest on the same sum for $4\frac{3}{5}$ years at double the earlier rate of interest?
(a)₹13500 (b)₹13800 (c)₹14200 (d)₹14500

MTS 2018

Q.7 If the rate of interest is 20% per annum, compounded yearly and the interest on a certain sum in the second year is ₹250, then what will be the interest on the same sum in the fifth year?
(a)₹518 (b)₹400 (c)₹360 (d)₹432

Q.8 If the compound interest in the third year at 8% per annum on a certain sum is ₹3600, then what is the difference between the compound interest in the 4th and the 5th year? (Nearest to an integer in ₹)
(a)₹304 (b)₹335 (c)₹288 (d)₹311

CGL MAINS 2018

Q.9 A sum of ₹18000 is lent at 10% per annum compound interest, compounded annually. What is the difference between the compound interest for 3rd year and 4th year?
(a)₹220.60 (b)₹217.80 (c)₹221.80 (d)₹215.40

Q.10 A loan has to be returned in two equal yearly instalments each of ₹44,100. If the rate of interest is 5% per annum, compounded annually, then the total interest paid is:
(a)₹5,840 (b)₹6,000 (c)₹6,200 (d)₹6,280

Q.11 A certain loan was returned in two equal half yearly instalments each of ₹6,760. If the rate of interest was 8% per annum, compounded annually, how much was the interest paid on the loan?
(a)₹750 (b)₹810 (c)₹790 (d)₹770

Q.12 A certain sum amounts to ₹4,205.55 at 15% per annumIn$2\frac{2}{5}$ years, interest compounded yearly. The sum is:
(a)₹3,200 (b)₹3,500 (c)₹2,700 (d)₹3,000

Q.13 what is the compound interest on a sum of ₹8,100 for $1\frac{1}{4}$ years at 8% per annum, if the interest is compounded 5-monthly? (Nearest to ₹1)
(a)₹837 (b)₹873 (c)₹842 (d)₹824

CHSL 2018

Q.14 A sum of ₹7,500 amounts to ₹8,748 after 2 years at a certain compound interest rate per annum. What will be the simple interest on the same sum for $4\frac{3}{5}$ years at double the earlier interest rate?
(a)₹4,140 (b)₹5,520 (c)₹8,180 (d)₹2,760

Q.15 What is the compound interest on a sum of ₹4,096 at 15% per annum for $2\frac{1}{2}$ years. If the interest is compounded 10-monthly?
(a)₹1,726 (b)₹1,736 (c)₹1,636 (d)₹1,763

Q.16 The compound interest on a certain sum for 3 years a 15% per annum, interest compounded yearly, is ₹4167. What is the simple interest on the same sum in $4\frac{4}{5}$ years at the same rate?
(a)₹6144 (b)₹6000 (c)₹4800 (d)₹5760

Q.17 A certain amount invested at a certain rate, compounded annually, grows to an amount in five years, which is a factor of 1.1881 more than to what it would have grown in three years. What is the rate percentage?
(a)8.1 (b)8 (c)9 (d)9.2

Q.18 A certain amount invested at a certain rate, compounded annually, grows to an amount in five years, which is a factor of 1.191016 more than to what it would have grown in two years. What is the rate percentage?

Bruce Wayne

(a)5 (b)6 (c)4 (d)8

Q.19 The compound interest on a certain sum of money at 21% for 2 years is ₹11,602.5. Its simple interest (in ₹) at the same rate and for the same period is:
(a)10,750 (b)16,000 (c)12,500 (d)10,500

CPO 2018

Q.20 A sum of ₹18,000 is invested for 16 months at 8% per annum compounded half-yearly. What is the percentage gain at the end of 16 months, to the nearest whole numbers:
(a)11% (b)10% (c)9% (d)12%

Q.21 A sum of ₹12,000 is invested for 15 months at 10% per annum compounded half yearly. What is the percentage gain, at the end of 15 months, to the nearest decimal place:
(a)13.0% (b)13.1% (c)12.8% (d)12.9%

Q22 A borrowed ₹28,500 at 8% per annum interest compounded annually. If ₹5,780 was paid by him at the end of first year, then the outstanding amount at the end of second year is:
(a)27,000 (b)27,462.40 (c)30,780 (d)33,242.40

Q.23 ₹2,40,000 is taken as loan for three years compounded annually at 12.5% per annum. At the end of first year, the interest is revised to 12% per annum. The total amount to be repaid at the end of third year is:
(a)₹3,38,688 (b)₹3,34,800 (c)₹3,42,648 (d)₹3,26,400

Q.24 Find the compound interest at the rate of 7% per annum compounded annually for two years on the principal that yields a simple interest of ₹9450 for 3 years at 7% per annum
(a)12,345.20 (b)6,520.50 (c)10,127 (d)12,678.40

Q.25 If the compound interest at 10% per annum, compounded half-yearly for $1\frac{1}{2}$ years is ₹2,522. The principal amount is:
(a)₹18500 (b)₹20000 (c)₹15400 (d)₹16000

MTS 2019

Q.26 A sum of ₹2000 is invested at compound interest (compounded annually). Find the amount after 30 months, if the rate of interest is 10% per annum?
(a)₹2538 (b)₹2524 (c)₹2541 (d)₹2532

Q.27 A sum of ₹10,000 is invested for 17 months at 8% per annum compounded half-yearly. What is the percentage gain at the end of 17 months, nearest to one decimal place?
(a)12.0% (b)12.2% (c)12.4% (d)11.8%

Q.28 A certain sum invested on compound interest (compounded annually) grows to ₹5040 in three years. If the rate of interest is 20% for the first year, 40% for the second and 50% for the third year, then what is the sum?
(a)₹1210 (b)₹2566 (c)₹1800 (d)₹2000

Q.29 A sum of ₹900 is invested at compound interest (compounded annually) for 2 years. If the rate of interest is 10% per annum, then what will be the amount?
(a)₹1071 (b)₹1089 (c)₹1289 (d)₹1121

Q.30 What is the difference between the compound interests on ₹10000 for 2 years at 20% per annum when the interests are compounded half yearly and yearly?
(a)₹241 (b)₹441 (c)₹440 (d)₹240

Q.31 A sum of money becomes ₹35,680 after 3 years and ₹53,520 after 6 years at a certain rate percentage per annum, interest compounded yearly. What is the compound interest on the same sum in the first case? (Your answer should be nearest to an integer)
(a)₹11,983 (b)₹11,893 (c)₹10,842 (d)₹11,938

CPO 2019

Q.32 A sum of ₹5,000 amounts to ₹7,200 in 8 years at a certain rate per cent per annum, interest compounded yearly. What will be the compound interest on a sum of ₹6,550 in 4 years at the same rate of interest?
(a)₹1,290 (b)₹1,285 (c)₹1,415 (d)₹1,310

CGL PRE 2019

Q.33 A and B together borrowed a sum of ₹51,750 at an interest rate of 7% per annum compound interest in such a way that to settle the loan, A paid as much amount after three years as paid by B after 4 years from the day of borrowing. The sum (in ₹) borrowed by A was:
(a)24,860 (b)25,650 (c)26,750 (d)25,000

Q.34 Amit borrowed a sum of ₹25,000 on simple interest. Bhola borrowed the same amount on compound interest (interest compounded yearly). At the end of 2 years, Bhola had to pay ₹160 more interest than Amit. The rate of interest charged per annum is:
(a)$\frac{16}{25}$% (b)8% (c)$\frac{1}{8}$% (d)$\frac{8}{25}$%

Q.35 A sum lent out at compound interest amounts to ₹1,250 in one year and to ₹1,458 in 3 years at a certain rate percentage per annum What is the simple interest on the same sum for $5\frac{2}{5}$ years at the same rate of interest?
(a)₹500 (b)₹520 (c)₹480 (d)₹600

Q.36 Ram deposited an amount of ₹8,000 in a bank's saving account with interest 6.5% compounded monthly. What amount will he get at the end of 18 months?
(a)₹8816.97 (b)₹8788.98 (c)₹8790.54 (d)₹8907.56

CGL MAINS 2019

Q.37 Surekna borrowed a sum of money and returned it in two equal annual instalments of ₹5547 each. If the rate of interest was $7\frac{1}{2}$%per annum compounded yearly, then the total interest paid by her was:
(a)₹1,144 (b)₹1,134 (c)₹1,096 (d)₹1,126

Q.38 A loan is to be returned in two equal instalments, if the rate of interest is 10% per annum Compounded annually, and

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each instalment is ₹5,808, the total interest charged in this scheme is:
(a)₹1,536 (b)₹1,632 (c)₹1,602 (d)₹1,563

Q.39 What will be the compound interest on a sum of Rs 31250, at 12% compound interest (interested compounded yearly) In $2\frac{2}{3}$ years?
(a) 11048 (b) 11096 (c) 11068 (d) 11086

CGL 2020

Q.40 What is the compound interest (in ₹) on a sum of ₹8192 fir $1\frac{1}{4}$ years at 15% per annum, if interest is compounded 5-monthy?
(a)1634 (b)1740 (c)1735 (d)1640

Q.41 A certain sum becomes ₹13650 at 15% per annum simple interest after 2 years. What will be the amount (in ₹) of the same sum after 1 year at the same rate of interest, if the interest is compounded half yearly? (Nearest to a ₹)
(a)11000 (b)12134 (c)13625 (d)10500

Q.42 A borrowed a sum of ₹160000 from B at 10% per annum simple interest. At the same time he lent the same sum to C at the same rate on compound interest, compounded semi-annually for 2 years. Find the amount (in ₹) earned by A in the whole transaction.
(a)4281 (b)2481 (c)4280 (d)2840

Q.43 A man borrowed a certain sum and agrees to repay it by paying ₹4000 at the end of first year and ₹7700 at the end of second year. If the rate of compound interest compounded annually is 10% per annum, then find the sum (in ₹) borrowed.
(a)11000 (b)9000 (c)11500 (d)10000

Q.44 A sum of ₹3125 amounts to ₹3515.20 in 3 years at x%per annum, interest being compounded yearly. What will be the simple interest (in ₹) on the same sum and for the same time at (x+2)%per annum?
(a)562.50 (b)565.50 (c)554 (d)550

Q.45 A loan is to be returned in two equal yearly instalments. If the rate of interest is 10% per annum, compounded annually and each instalment is ₹6534, then the total interest charged (in ₹) is:
(a)1867 (b)1642 (c)1728 (d)1579

Q.46 At what rate percent per annum will ₹7200 amounts to ₹7938 in one year, if interest is compounded half yearly?
(a)12 (b)8 (c)5 (d)10

Q.47 A sum of ₹9500 amounts to ₹11495 in 2 years at a certain rate percent per annum, interest compounded yearly. What is the simple interest (in ₹) on the same sum for the same time and double the rate?
(a)3990 (b)3800 (c)3420 (d)4560

Q.48 Atul borrowed a sum of ₹12000 and agreed to repay it by paying ₹4800 at the end of first year and ₹9240 at the end of second year. What is the rate of compound interest compounded annually?
(a)12% (b)$\frac{8}{5}$% (c)10% (d)8%

Q.49 What is the difference between the compound interest (in ₹) compounded yearly and compounded half yearly for 18 months at 20% per annum on a sum ₹12000?
(a)165 (b)121 (c)145 (d)132

CHSL 2020

Q.50 What will be the compound interest (in ₹) on a sum of ₹7,200 for 18 months at a rate of 20% per annum, If the interest is compounded half yearly (nearest to an integer)?
(a)2,338 (b)2,833 (c)3,238 (d)2,383

Q.51 Krishna invested a sum of ₹25,000 in two parts. He earned 11% per annum simple interest on part 1 and 10% per annum compound interest compounded annually on part 2. If the total interest received by him after 2 years is ₹5,370, then find the sum invested on simple interest.
(a)₹12,000 (b)₹12,500 (c)₹11,000 (d)₹13,000

Q.52 In what time will a sum of ₹1,25,000 amounts to ₹1,48,877 at 12% per annum. If interest is being compounded half yearly?
(a)$2\frac{1}{2}$ years (b)1 year (c)$1\frac{1}{2}$ years (d)3 years

Q.53 Find the compound interest (in ₹) on a sum of ₹7,500 for 4 years if the rate of interest is 20% per annum for the first two years and 10% per annum for the next two years. (The interest is compounded annually)
(a)5,586 (b)6,558 (c)5,658 (d)5,568

Q.54 The compound interest (in ₹, to the nearest integer) on ₹8,950 for 2 years at the rate of 9% per annum, compounded annually is:
(a)1,683 (b)1,468 (c)1,523 (d)1,658

Q.55 What is the compound interest (in ₹) on a sum of ₹46,000 for $2\frac{2}{5}$ years at 15% per annum, interest being compounded annually (nearest to a ₹)?
(a)18,485 (b)19,485 (c)18,458 (d)19,458

Q.56 A sum of money amounts to ₹28,224 in 2 years and to ₹29,635.20 in 3 years when invested on compound interest, compounded annually. What is the sum of money?
(a)₹26,095 (b)₹26,000 (c)₹26,880 (d)₹25,600

Q.57 A man invested a total of ₹12,050 in two parts, one at 10% per annum simple interest for 2 years and the other at the same rate at compound interest, interest being compounded annually, for the same time. The amounts he received from both the parts are equal. The sum (in ₹) invested at the compound interest is:
(a)5,850 (b)6,000 (c)5,780 (d)5,800

Q.58 A mobile phone is available for ₹79,860 cash payment or by paying cash of ₹60,000 as down payment and the remaining in three equal annual instalments. If the

shopkeeper charges interest at the rate of 10% per annum compounded annually, then the amount of each instalment (in ₹) will be:
(a)6,789 (b)6,689 (c)7,986 (d)6,000

SSC SELECTION PHASE IX

Q59. A certain sum amounts to Rs11,520 in 4 years at the rate of 15% p.a. simple interest. What will be the amount of the same sum in 2 years at the same rate, if the interest is compounded 8-monthly (nearest to a Rs)?
(a) Rs9,338 (b) Rs9,583 (c) Rs9,853 (d) Rs9,538

Q60. What is compound interest (in rs) on Rs 80,000 for 3 years when the rate of interest is 5%, 8% and 10% per annum for the 3 successive years, the interest being compounded annually?
(a) 20,500 (b) 19,792 (c) 20,000 (d) 18,000

Q61. Ritu borrowed a sum of Rs9,000 for 2 years at 15% p.a, interest compounded 8- monthly. The amount (in Rs) paid by her after 2 years was:
(a) 12,045 (b) 11,979 (c) 12,089 (d) 11,968

Q62. A sum of Rs x amounts to Rs49,247 at 15% p.a. in 2 years, interest compounded 8-monthly. The value of x is:
(a) 42,000 (b) 36,000 (c) 38,000 (d) 37,000

SSC CGL PRE 21

Q63. A certain sum is deposited for 4 years at a rate of 10% per annum on compounded annually. The difference between the interest at the end of 2 years and that at the end of 4 years is Rs5,082. Find the sum (in Rs).
a) 25,500 b) 20,000 c) 10,164 d) 50,820

Q64. What is the amount (in Rs) of a sum of Rs32,000 at 20% per annum for 9 months, compounded quarterly?
(a)35087 (b) 30876 (c) 32000 (d) 37044

Q65. Joseph deposited a total of RS52,500 in a bank in the names of his two daughters aged 15 years and 16 years in such a way that they would get equal amounts when they become 18 years old. If the bank gives 10% compound interest compounded annually, then what is the amount (in Rs) that Joseph had deposited in the name of his younger daughter?
a) 25,000 b) 24,500 c) 26,000 d) 27,500

Q66. What is the compound interest (in Rs) at the rate of 10%, compounded annually, for 3 years on the principal which in 8 years at the rate of 12% per annum gives Rs4,800 as simple interest?
a) 1,455 b) 2,045 c) 1,505 d) 1,655

Q67. The difference between compound interest compounded annually and simple interest on a certain sum at a rate of 15% per annum for 2 years is Rs1,944. Find the compound interest compounded annually (in Rs) on the same sum for the same period at a rate of 10% per annum.
a) 18,144 b) 18,060 c) 27,216 d) 20,500

Q68. Divide Rs66,300 between A and B in such a way that the amount that A receives after 8 years is equal to the amount that B receives after 10 years, with compound interest being compounded annually at a rate of 10% per annum.
a) A = Rs35,200, B = Rs31,100
b) A = Rs35,520, B = Rs30,810
c) A = Rs37,000, B = Rs29,300
d) A = Rs36,300, B = Rs30,000

Q69. What is the compound interest (in Rs) on a sum of Rs62,500 for 2 years at 12% p.a, if the interest is compounded 8-monthly?
a) 18,342 b) 16,232 c) 13,428 d) 16,548

SSC MTS 2020

Q70. A sum amounts to Rs 11,616 in 2 years and to Rs 12,777.60 in 3 years, when the interest in compounded annually. The sum (in Rs) is:
(a) 8,500 (b) 8,400 (c) 9,000 (d) 9,600

Q71. A certain sum was invested for 3 years in a scheme in which the interest gets compounded annually. During the first 2 years, the scheme provided growths at the rates of 80% and 60% respectively. But during the third year there was a decline by 40% .what was the overall interest rate for three years?
(a) 22.5% (b) 24% (c) 20% (d) 48.6%

Q72. If a certain sum at compound interest becomes $2\frac{1}{2}$ times in 5 years, then in how many years will it become $6\frac{1}{4}$ times, at the same rate of interest p.a.?
(a) 8 years (b) 12 years (c) 9 years (d) 10 years

Q73. A farmer borrowed Rs 1,32,000 from a money lender to do cultivation in his field. The rate of interest is 12.5% p.a compounded annually. At the end of two years, he cleared his loan by paying Rs 1,07,062.50 and his scoter. The cost (in Rs) of the scooter is:
(a) 50,000 (b) 45,000 (c) 75,000 (d) 60,000

DP 2022

Q74. A man borrows Rs18,000 and undertakes to pay back with compound interest at a rate of 20% annually in two equal yearly instalments. The amount of each instalment is:
a) Rs12,152.35 b) Rs12,102.74
c) Rs11,555.32 d) Rs11,781.82

Q75. If the cost of a mobile phone is Rs25,000, available at Rs5,000 down payment followed by 3 equal annual instalments (each instalment is to be paid at the end of each year) at the rate 25% p.a. compound Interest, then find the value of each instalment (rounded off to two decimal places):
a) Rs10,245.90 b) Rs13,021
c) Rs17,361 d) Rs10,245.09

Q76. A sum of money after a period of 2 years becomes Rs34,560, and it becomes Rs41,472 after a period of three years, being compounded at 'R' rate of interest. What is the value of R?

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a) 25% b) 20% c) 12% d) 10%

Q77. At what per cent is the annual compound interest rate taken such that a certain cum amounts to its 16 times in 4 years?
a) 100% b) 175% c) 75% d) 200%

Q78. Richa took a loan of Rs1,20,000 for 1 year at 20% per annum, compounded quarterly. The amount that Richa has to pay after 1 year is:
a) Rs1,45,860.75 b) Rs1,45,863.75
c) Rs1,45,862.75 d) Rs1,45,861.75

Q79. Rita invested Rs50,000 in a bank. In two years how much compound interest will she get, if the first-year rate of interest was 10% and in the second year it was 4% more than the first year?
a) Rs12720 b) Rs12710 c) Rs12690 d) Rs12700

Q80. How much should you invest today at 10% compound interest annually, to accumulate Rs1,61,051 in 5 years?
a) Rs100000 b) Rs111000 c) Rs110000 d) Rs111100

CPO PRE 22

Q81. A man borrowed Rs50,000 from a bank at 10% per annum, compounded annually. At the end of every year, he pays Rs15,000 as part payment of the loan and interest. How much does he still owe to the bank after three such instalments?
a) Rs16,900 b) Rs15.800 c) Rs15,200 d) Rs16,200

Q82. A sum becomes Rs7436 in two years when interest is compounded annually at the rate of 4% per annum. What was the sum?
a) Rs7075 b) Rs6275 c) Rs6575 d) Rs6875

CGL PRE 22

Q83. A person borrows Rs1,00,000 from a bank at 10% per annum compound interest and clears the debt in five years. If the instalment paid at the end of the first, second, third and fourth years to clear the debt are Rs10,000, Rs20,000, Rs30,000 and Rs40,000, respectively, what amount should be paid at the end of the fifth year to clear the debt?
a) Rs38,250 b) Rs39,490 c) Rs40,450 d) Rs36,450

Q84. A sum of Rs6000 is to be paid back in two equal annual instalments, each in instalment is to be paid at the end of every year. How much is each instalment if the interest is compounded annually at 2% p.a.?(Rounded off up to two decimal places)
a) Rs2,092.29 b) Rs3,090.30
c) Rs2,291.29 d) Rs3,589.30

CGL MAINS 2022

Q85 Rajnish borrowed Rs 1,500 from a bank and repaid the entire amount with Interest In two equal annual instalments, the first instalment being paid a year after Rajnish borrowed from the bank. If the rate of interest was 40% per annum, compounded annually, then what was the value (in e) of each instalment paid by Rajnish?
a) 1125 b) 1470 c) 1225 d) 1350

CHSL PRE 2022

Q86 Rs 6000 is lent at the rate of 20 percent per annum on compound interest (compounded half yearly). What will be the compound interest of 18 months ?
a) Rs 1825 b) Rs 1876 c) Rs 2036 d) Rs 1986

Q87 If 10 percent per annum rate of compound interest compounded yearly is equivalent to the x percent per annum rate of compound interest compounded half yearly, then what is the value (Approximate) of x?
a) 5.32% b) 4.88 % c) 4.55 % d) 6.25 %

CHSL PRE 23

Q88. What sum will become Rs 9826 in 18 months if the rate of interest is $2\frac{1}{2}\%$ per annum and the interest is compound half yearly?
1. Rs 9,392.00 2. Rs 9,466.55
3. Rs 9,444.00 4. Rs 9,512.45

Q89. If the difference between the compound interest and simple interest on a certain sum of money for 3 years at the rate of 4% per annum is Rs 76, then what is the sum?
1. Rs 12,925 2. Rs 15,625 3. Rs 16,725 4. Rs 18, 825

Q90. A computer is available for Rs 39,000 on cash payment or Rs 19,000 as cash payment followed by five monthly instalments of Rs 4200 each. What is the rate of interest per annum under the instalment plan?
1. $20\frac{20}{29}\%$ 2. $20\frac{19}{29}\%$ 3. $20\frac{18}{29}\%$ 4. $20\frac{17}{29}\%$

Q91. A certain amount of money was lent for a period of 1 year 9 months at a rate of 10% per annum compounded annually. If the compound interest is Rs 1460, find the amount of money lent.
1. Rs 8200 2. Rs 8000 3. Rs 7500 4. Rs 6000

Q92. A sum amounts to Rs 6120 in 2 years and Rs 7340 in 3 years at compound interest. The sum (in Rs) is (rounded off to 2 decimal places):
1. 4560.23 2. 4850.32 3. 4254.63 4. 4050.13

Q93. What is the amount (in Rs) of debt that will be discharged in 6 equal instalments of Rs 800 each. If the debt is due in 6 years at 5% per annum?
1. 8000 2. 6600 3. 5400 4. 7500

CPO 2024

Q94. A certain amount of money becomes thrice in 5 years at compound interest. How many years it will take to become 9 times?
a) 15 years b) 8 years c) 10 years d) 25 years

Bruce Wayne

ANSWERS

1	B	2	B	3	B
4	A	5	A	6	B
7	D	8	D	9	B
10	C	11	D	12	D
13	A	14	B	15	B
16	D	17	C	18	B
19	D	20	A	21	A
22	A	23	A	24	B
25	D	26	C	27	D
28	D	29	B	30	A
31	B	32	D	33	C
34	B	35	A	36	A
37	B	38	A	39	D
40	A	41	B	42	B
43	D	44	A	45	C
46	D	47	B	48	C
49	D	50	D	51	A
52	C	53	D	54	A
55	A	56	D	57	B
58	C	59	B	60	B
61	B	62	D	63	B
64	D	65	A	66	D
67	A	68	D	69	B
70	D	71	C	72	D
73	D	74	D	75	A
76	B	77	A	78	A
79	D	80	A	81	A
82	D	83	B	84	B
85	C	86	D	87	B
88	B	89	B	90	A
91	B	92	C	93	C
94	C				

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1. $R = 16\%$

(1) 15000

2400 | 2400 | 2400

2400 | 384 | 384

384

61.44

Difference = 445.44 ₹

2. 100 : 121 | −6634 | 10 : 11

12000 + 6634 = 18634

12000 | 13200

15400 Ans

3. $R = 5\% = \frac{1}{20}$

20 : 21 × 21

400 : 441 → 35280

820 → 65600 Ans

4. (4) $\frac{20736 - 12000}{12000} \times 100$

R% = 72.8 (3yr)

1 yr → 20%

for 2 yr → 44%

Amt → $12000 \times \frac{144}{100}$ = 17280 Ans

5. $\frac{63654 - 60000}{60000} \times 100$

R = 6.09% for 2 yrs

R = 3% for 1 yr

Amount → $60000 \times \frac{103}{100}$

= 618000 Ans

6. $R = 4\% = \frac{1}{25}$

$25^2 : 26^2$

625 : 676

P → 18750 → 20280

Required SI →

$\frac{18750}{100} \times \frac{23}{5} \times 16$

= 13800 ₹ Ans

7. $R = 20\% = \frac{1}{5}$

2nd : 5th

$(5)^3 : (6)^3$

125 : 216

250 → 432 ₹ Ans

8. 4th → 8%

5th → 16.64%

Diff → 8.64%

CI = 3600 × 8.64%

= 311.04 Ans

9. R → 10%

3rd → 33.1 − 21 ⇒ 12.1%

4th → 46.41 − 33.1 = 13.31%

Difference → 1.21%

18000 × 1.21% = 217.8 ₹ Ans

10. $R = 5\% = \frac{1}{20}$

20 : 21 × 21

400 : 441 → 44100

820 : 882

62 → 6200 Ans

11. $R = \frac{8\%}{2} = 4\% = \frac{1}{25}$

25 : 26 × 26

625 : 676 → 676

1275 | 1352

77 → 770 ₹

12.

P	A
20	23
20	23
50	53
20000	28037
↓ 0.15	↓ × 0.15
3000 ₹ Ans	4205.55

13. R% yearly → 8%

5 monthly → $\frac{10}{3}\%$

8100

270 | 270 | 270

9 | 9 | 9

3

CI = 837 Ans

14. $r = \sqrt{\frac{8748}{7500}} = \sqrt{\frac{2916}{2500}}$

$r = \frac{54}{50} = \frac{27}{25} = 8\%$

SI = $75 \times \frac{23}{5} \times 8$ = 2760 ₹

15. (15) R% (10 monthly) = $\frac{15}{12} \times 10 = \frac{25}{2}\%$

4096

512 | 512 | 512

64 | 64

64

8

CI = 1736 ₹ Ans

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16.

$15\% = \frac{3}{20}$

P	A
20	23
20	23
20	23
8000	12167

$\downarrow$ P $\quad 4167 \xrightarrow{\times 1} 4167$

$SI = 8000 \times \frac{24}{5} \times \frac{15}{100}$

$= 5760$ ₹ Ans

17.

$\sqrt[2]{\frac{11881}{10000}} = \frac{109}{100}$

$r = 9\%$ Ans

18.

$\sqrt[3]{\frac{191016}{100000}} = \frac{106}{100}$

$r = 6\%$ Ans

19.

Effective Rate = 46.41%

$SI = \frac{11602.5}{46.41} \times 21 \times 2$

$= 10500$ ₹ Ans

20.

Half yearly rate → 4%

effective rate → 11% Ans

21.

Effective rate =

$5 + 5 + 0.25 = 10.25$

$10.25 + \frac{5}{2} + 0.25625$

⇒ 13% Ans

22.

$\left(28500 \times \frac{27}{25} - 5780\right) \times \frac{27}{25}$

$= 27000$ ₹ Ans

23.

$240{,}000 \times \frac{9}{8} \times \frac{28}{25} \times \frac{28}{25}$

$= 338688$ ₹ Ans

24.

$\frac{9450}{21} \times 100 = 45000$

45000

3150 $\quad$ 3150

220.5

⇒ 6520.50 Ans

25.

Effective rate = 15.7625%

$P = \frac{2522}{15.7625} \times 100 \times 10000$

$= 16000$ ₹ Ans

26.

2000

10% $\quad$ 10% $\quad$ 5%

200 $\quad$ 200 $\quad$ 100

20 $\quad$ 10

10

1

541

Amount → 2541 Ans

27.

Effective rate →

$4 + 4 + 0.16 = 8.16$

$8.16 + \frac{4}{6} \times 5 + 0.272$

⇒ 11.2% Ans

28.

P		A
5	:	6
5	:	7
2	:	3
25	:	63

$\downarrow 80 \quad \downarrow \times 80$

2000 ₹ Ans $\quad$ 5040

29.

(29) 900

90 $\quad$ 90

9

Amount ⇒ 900 + 189

= 1089 ₹ Ans

30.

Half yr. rate → 10%

Effective rate → 46.41%

Yearly effective rate → 44%

Difference → 2.41%

⇒ 2.41% × 10000

= 241 ₹ Ans

31.

(31) $\frac{53520}{35680} = \frac{3}{2}$

$CI = \frac{35680}{3} = 11893$ ₹ Ans

32.

$\sqrt{\frac{7200}{5000}} = \frac{12}{10} = 20\%$

6550 × 20% = 1310 Ans

33.

$\frac{A}{B} = \frac{107}{100} \rightarrow 207$

207 ⟶ 51750

107 ⟶ 26750 Ans

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34.

Go by option,

$25000 \times \frac{8}{100} \times \frac{8}{100} = 160$

So R = 8% Ans

35.

$\sqrt{\frac{1458}{1250}} = \frac{27}{25}$

R% = 8%

$SI = \frac{1250}{27} \times \frac{25}{100} \times \frac{27}{5} \times 8$

= 500 ₹ Ans

36.

(36) Amt

$= 8000\left[1 + \frac{6.5}{(12 \times 100)}\right]^{18}$

$= 8000\ (1.0054)^{18}$

$= 8000\ (1.1021)$

= 8816.97 Ans

37.

40	43 × 43
1600	1849
3320	3698

378

1849 → 5547

378 → 1134 ₹ Ans

38.

10 : 11 × 11

100 : 121

210 : 242

32

121 → 5808

32 → 1536 ₹ Ans

39.

31250

3750 | 3750 | 2500

450 | 300

300

36

CI = 11086 ₹ Ans

40.

5 monthly Rate

$= \frac{15}{12} \times 5 = \frac{25}{4}\%$

8192

$\frac{1}{16}$ $\frac{1}{16}$ $\frac{1}{16}$

512 | 512 | 512

32 | 32

32

2

CI = 1634 ₹ Ans

41.

$P = \frac{13650}{130} \times 100 = 10500$

CI → 10500 × 115.5625%

= 12134 Ans

42.

SI → 32000

CI → 160000

8000 | 8000 | 8000 | 8000

400 | 400 | 400

400 | 400

20 | 400

20

20

20

1

CI = 34481

Profit → 34481 − 32000

= 2481 ₹ Ans

43.

$\left(x \times \frac{11}{10} - 4000\right) \times \frac{11}{10} = 7700$

x = 10000 ₹ Ans

44.

$3\sqrt{\frac{35152}{31250}} = \frac{26}{25}$

r = 4%

$SI = \frac{3125 \times 6 \times 3}{100}$

= 562.5 ₹ Ans

45

P	A
10	11 × 11
100	121
210	242

32

$I = \frac{6534}{121} \times 32$

= 1728 ₹ Ans

46.

$\sqrt{\frac{7938}{7200}} = \frac{21}{20} = 5\%$

R = 10% Ans

47.

$r\% = \sqrt{\frac{11495}{9500}} = \sqrt{\frac{121}{100}}$

r = 10%

SI = 95 × 20 × 2

= 3800 ₹ Ans

48.

(48) Go by option

10%

$\left(12000 \times \frac{11}{10} - 4800\right) \times \frac{11}{10} = 3240$

LHS = RHS

49.

Effective Rate yearly = 32%

Half yearly = 33.1%

Difference = 12000 × 1.1%

= 132 Ans

50.

Effective rate yearly = 33.1%

CI = 7200 × 33.1

= 2383 ₹ (approx.) Ans

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51.

$x + y = 25000$ —①

$22x + 22y = 537000$ —②

$x = 12000$ ₹ Ans

52.

(52) $6\% = \frac{3}{50}$

$\frac{53}{50} \longrightarrow 125000$

So, Time $1\frac{1}{2}$ year = 18 months

53.

7500

1500 | 1500 | 750 | 750

300 | 150 | 150

150 | 75

30 | 30

15

15

3

= 5568 ₹ Ans

54.

$8950 \times 18.81\%$

= 1683 (Approx) Ans

55.

46000

6900 | 6900 | 2760

1035 | 414

414

62.1

CI = 18485 ₹ Ans

56.

$\frac{P}{28224} = \frac{282240}{296352}$

P = 26880 ₹ Ans

57.

$x \times 120 = y \times 121$

$\frac{x}{y} = \frac{121}{120}$)241 → 12050, 120 → 6000 ₹ Ans

58.

Last Amt = 79860 − 60000

= 19860

10 : 11 ×121

100 : 121 ×11

1000 : 1331

3310 3993

↓

9860

331 → 7986 Ans

59.

$P = \frac{11520}{160} \times 100 = 7200$

7200

10%

720 | 720 | 720

72 | 72

72

7.2

CI = 2383

Amount → 9583 ₹ Ans

60.

80000

4000 | 6400 | 8000

320 | 400

640

32

CI = 19792 ₹ Ans

61.

Effective Rate = 33.1%

CI = 9000 × 33.1%

= 2979 Rs.

Amount → 11979 ₹ Ans

62.

R = 10%

Effective Rate = 33.1%

$X = \frac{49247}{133.1} = 37000$ ₹ Ans

63.

1 Effective rate 2yr → 21%

4yr → 46.41%

Sum = $\frac{5082}{25.41} \times 100 = 20000$ Ans

64.

32000

1600 | 1600 | 1600

80 | 80

80

4

Amount = 32000 + 5044

= 37044 Ans

65.

$\frac{x}{y} = \frac{11}{10}$

21 → 52500

11 → 27500 ₹ Ans

66.

$P = \frac{4800}{96} = 5000$

CI = 5000 × 33.1%

= 1655 ₹ Ans

67.

$P = \frac{1944}{2.25} \times 100 \Rightarrow 86400$

CI = 86400 × 21%

= 18144 ₹ Ans

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68.

$\frac{A}{B} = \frac{121}{100}$) 221

221 → 66300

A = 121 → 36300

B = 100 → 30000

69.

62500

5000 | 5000 | 5000

5000 | 400 | 400

400

32

CI = 16232 ₹ Ans

70.

$\frac{127776}{11616} = \frac{11}{10}$

$P = \frac{11616}{121} \times 100$

= 9600 ₹ Ans

71.

5 : 9

5 : 8

5 : 3

125 : 216

$(125)^{1/3} : (216)^{1/3}$

5 : 6

20% Ans

72.

5yrs → $\frac{5}{2}$ times

↓ ↓

10yr Ans $\frac{25}{4}$

73.

132000

16500 | 16500

2062.5

Amt → 167062.5

Scooter → 167062.5 − 107062.5

= 60000 ₹ Ans

74.

20% = $\frac{1}{5}$

5 × 6

85 | 36

30

55 — 18K

36 — $\frac{18K}{55} \times 36$

= 11781.82

75.

25% = $\frac{1}{4}$

4 × 5

16 | 25

64 | 125

100

80

244 — (25000 − 5000)

125 — $\frac{20K}{244} \times 125$

= 10245.90

76.

$\frac{P\left(1+\frac{R}{100}\right)^3}{P\left(1+\frac{R}{100}\right)^2} = \frac{41472}{34560}$

$\left(1+\frac{R}{100}\right) = 1.2$

R = 20%

77.

4 — 16 times

1 — $(2)^4$

1 — 2

$\frac{1}{1} \times 100 = 100\%$

78.

R = $\frac{20}{4}$ = 5%

T = 4

120000

6K | 6K | 6K | 6K

300 | 300 | 300 | 300

300 | 300

15 | 300

15

15

·75

A = 120K + 4×6K + 300×6 + 15×4 + ·75

= 145860.75

79.

50.000

10% | 14%

5000 | 7000

700

= 5000 + 7000 + 700

= 12700

80.

$P \times \left(1+\frac{10}{100}\right)^5 = 161051$

$P = \frac{161051 \times 10^5}{11^5}$

$P = 10^5 = 100000$

81.

Total Payble ⇒ $50000 \times \frac{131 \cdot 1}{100}$

= 66550

15000 | 15000 | 15000

1500 | 1500

1500

150

T ⇒ 45000 + 4500 + 150

= 49650

Pay = 66550 − 49650

= 16900

82.

4 + 4 + $\frac{4 \times 4}{100}$

= 8.16%

$\frac{7436}{108.16} \times 100$

= 6875

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83.

$1^{st}y = 1L \times \frac{110}{100} - 10k = 1L$

$2^{nd}y = 1L \times \frac{110}{100} - 20k = 90k$

$3^{rd}y = 90k \times \frac{110}{100} - 30k = 69k$

$4^{th}y = 69k \times \frac{110}{100} - 40k = 35900$

$(as\ i\ y = 35900 \times \frac{110}{100} = 39490$

84.

$2\% = \frac{1}{50}$

50 — 51

8500 — 2601

2550

5050 — 6000

2601 — $\frac{6000}{5050} \times 2601 = 3090.30$

85.

$40\% = \frac{2}{5}$

5 — 7

25 — 49

35

60 → 1500

49 — $\frac{1500}{60} \times 49 = 1225$

86.

half yearly ⇒ half rate

$R = 10\%$

⇒ Time double

⇒ 36 months (3 yr)

consolidated rate of 3 yr

⇒ 33.1%

⇒ $\frac{6000 \times 33.1}{100} \Rightarrow 1986$

87.

Amount Interest = 10%

X% is compounded half yearly

$x + x + \frac{x^2}{100} = 10$

$\frac{2x + x^2}{100} = 10$

$2000x + x^2 = 1000$

$x = 4.88\%$ (approx)

88.

$T = 18\ month = 3\ cycle$

$R = \frac{5}{2} \times \frac{1}{2} = \frac{5}{4}$

$P\left(1 + \frac{5}{400}\right)^3 = 9826$

$P = 9466.54$

89.

$S.I = 4 \times 3 = 12\%$

$C.I = 4, 4, 4 = 12.4864$

.4864 — 76

100 — 15625

90.

Rem = 39000 − 19000 = 20000

5 monthly Amount

$20000 + 20000 \times \frac{5}{12} \times \frac{R}{100}$

$= 20000 + \frac{250R}{3}$

Int Amount

4200 + 4200(4month + 3month + 2mon + 1m) of SI

$4200 \times 5 + 4200(10\ mon)\ SI$

$4200 \times 5 + 4200 \times \frac{10}{12} \times \frac{1}{100} R$

$4200 \times 5 + 35R$

$20000 + \frac{250}{3}R = 21000 + 54$

$R = 20\frac{20}{29}\%$

91.

For 1Y = R = 10%.

9 month = $\frac{10}{12} \times 9 = 7.5\%$

$R = 10 + 7.5 + \frac{10 \times 7.5}{100} = 18.25$

$\frac{1460}{18.25} \times 100 = 8000$

92.

3Y = 7340

2Y — 6120

7340 : 6120

367 : 306

$6120 \times \frac{306}{367} \times \frac{306}{367}$

$\frac{6120 \times 93636}{134689}$

$= 4254.63$

93.

100 + 105 + 110 + 115 + 120 + 125 = 675

100 — 800

675 — 5400.

94.

5 — $(3)^2$

$5 \times 2 = 10.$

95. THE END.

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TIME SPEED & DISTANCE

CGL PRE 2018

Q1. A truck covers a distance of 384 km at a certain speed. If the speed is decreased by 16 km/h, it will take 2 hours more to cover the same distance. 75% of its original speed (in km/h) is:
(a) 45 (b) 54 (c) 48 (d) 42

Q2. A takes 30 minutes more than B to cover a distance of 15 km at a certain speed. But if A doubles his speed, he takes one hour less than B to cover the same distance. What is the speed (in km/h) of B?
(a) 6 (b) 5 (c) $6\frac{1}{2}$ (d) $5\frac{1}{2}$

Q5. A train travelling at 44 km/h cross a man walking with a speed of 8 km/h in the same direction, in 15 seconds the train crosses a woman coming from the opposite direction in 10 seconds then what is the speed (in km/h) of the woman?
(a) 10.5 (b) 10 (c) 9 (d) 8.5

Q6. The speed of train A is 25 km/h more than the speed of train B. A takes 4 hours less time to travel a distance of 300 km than what train B takes to travel 250 km. What is the speed (in km/h) of A?
(a) 60 (b) 50 (c) 65 (d) 55

Q7. A train without stoppage travel with an average speed of 50 km/h and with stoppage, it travels with an average speed of 40 km/h. For how many minutes does the train stop on an average per hour?
(a) 13 (b) 14 (c) 15 (d) 12

Q8. The speed of a car increases by 2 km/h after every one hour. If the distance travelled in the first one hour was 35 km, what was the total distance travelled in 12 hours?
(a)560 km (b)650 km (c)558 km (d)552 km

CGL MAINS 2018

Q9. A train travelling at the speed of x km/h crossed a 200 m long platform in 30 seconds and overtook a man walking in the same direction at the speed of 6 km/h in 20 seconds. What is the value of x?
(a)50 (b)54 (c)56 (d) 60

Q10. Renu was sitting inside train A, which was travelling at 50 km/h. Another train, B, whose length was three times the length of A crossed her in the opposite direction in 15 seconds. If the speed of train B was 58 km/h, then the length of train A (in m) is:
(a) 210 (b) 112.5 (c) 124.5 (d) 150

Q11. Places A and B are 396 km apart. Train X leaves from A for B and train Y leaves from B for A at the same time on the same day on parallel tracks. Both trains meet after $5\frac{1}{2}$ hours. The speed of Y is 10 km/h more than that of X. What is the speed (in km/h) of Y?
(a) 41 (b) 54 (c) 31 (d) 56

Q12. To cover a distance of 416 km sin A takes $2\frac{2}{3}$ hours more than train B. If the speed of A is doubled, it would take $1\frac{1}{3}$ hours less than B. What is the speed (in km/h) of train A?
(a) 56 (b) 54 (c) 52 (d) 65

Q13. A person covers 40% of the distance from A to B at 8 km/h, 40% of the remaining distance at 9 km/h and the rest at 12 km/h. His average speed (in km/h) for the journey is :
(a) $9\frac{5}{8}$ (b) $9\frac{2}{3}$ (c) $9\frac{1}{3}$ (d) $9\frac{3}{8}$

CGL PRE 2018

Q14. A journey of 96 km takes one hour less by a fast train (A) than by a slow train (B) If the average speed of B is 16 km/h less than that of A, then the speed (in km/h) of A is:
(a) 64 (b) 48 (c) 54 (d) 60

CHSL PRE 2018

Q15. A train covers a certain distance in 45 minutes. If its speed is reduced by 5 km/h, it takes 3 minutes more to cover the same distance. The distance (in km)
(a) 60 (b) 80 (c) 54 (d) 64

Q16. If I travel by bus, I reach my office 15 min late, and if I travel by car, I reach 10 min early. If the distance between my home and my office is 25 km, then the difference of the reciprocals of average speeds of the bus and the car, in second per metre is:
(a) $\frac{3}{25}$ (b) $\frac{3}{50}$ (c) $\frac{3}{20}$ (d) $\frac{3}{10}$

Q17. Given that the lengths of the paths of a ball thrown with different speeds by two boys are the same, and the average speed for the first and second throws are respectively 90 km/h and 162 km/h, then what is the time taken by the first throw to cover the length if the same for the second thrown is one second?
(a) $\frac{3}{2}$ sec (b)1 sec (c) $\frac{9}{5}$ sec (d) $\frac{2}{3}$ sec

CPO 2018

Q18. If a train runs with the speed of 48 hr, it reaches its destination late by 12 minutes. However, if its speed in 64 km/hr it is late by 3 minutes only. The right time for the train to in to cover the journey (in minutes) is:
(a) 24 (b) 18 (c) 20 (d)22

Q19. If a train runs with the speed of 52km/h, it reaches its destination late by 15 minutes. However, if its speed is 65km/h, it is late by 5 minutes only. The right time for the train to cover its journey is:
(a)45 min (b)40 min (c)35 min (d)30 min

Q20. A boy goes from his house to the park 500 m away in 5 minutes and comes back in 7 minutes. Their average moves:
(a) 1 (b) 12 (c) 2.5 (d) 5

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MTS 2019

Q21 A man leaves from P at 6 am and reaches Q at 2 pm on the same day. Another man leaves Q at 8 am and reaches P at 3 pm on the same day. At what time do they meet?
(a) 11:46 am (b) 11:24 am (c) 10:48 am (d) 11:00 am

Q22. A train leaves P at 9 am with speed of 30 km/h. Another train leaves Q at 11 am with speed of 45 km/h. The trains are travelling towards each other on parallel tracks. Distance between P and Q is 300 km. When they meet, what is the ratio of the distances covered by them?
(a) 8:5 (b) 13:12 (c) 17:14 (d) 11:9

Q23. Alok starts walking from P with speed of 6 km/h towards Q. Raman starts at same time from P towards with speed of 9km/h. Raman reaches Q, turns back and starts walking towards P. He meets Alok at R. If PQ is 15 km, then what is PR?
(a) 20 km (b) 12 km (c) 15 km (d) 18 km

Q24. A travels a certain distance with three different speeds; first covers 3 km with a speed of 9 km/h, the second 6 km with a speed of 15 km/h and the third 9 km with a speed of 18 km/h. What is the average speed of A's entire journey?
(a) $\frac{660}{37}$ km/h (b) $\frac{480}{37}$ km/h (c) $\frac{460}{37}$ km/h (d) $\frac{540}{37}$ km/h

Q25. The average speed of a car is 600 m/min. How much slower does the car run (in meters/second) than a sprinter who travels 100 meters in 9.6 seconds?
(a) $\frac{5}{24}$ (b) $\frac{1}{2}$ (c) $\frac{7}{12}$ (d) $\frac{5}{12}$

Q.26 A man goes from C to D at 40 km/h and he returns from D to C at x km/h. If the average speed of the man for the whole journey is 60km/h. then what is the value of x?
(a) 100 (b) 120 (c) 110 (d) 80

Q27. In 100m race A beats B by 10 m and B beats C by 10 m. By what distance A beat C (in m)?
(a) 19 (b) 18 (c) 20 (d) 22

Q.28 A man goes to a place on car at speed of 160 km/h and comes back at lower speed. If the average speed is 64 km/h in total, then the return speed (in km/h) is:
(a) 25 (b) 80 (c) 40 (d) 60

Q29. A person starts a journey. He travelled 16 hours in all. He covered the first half of the distance @ 40 km/h and the other half @ 60 km/h. Find the total distance covered by him.
(a) 384 km (b) 576 km (c) 768 km (d) 960 km

Q30. A person travels a certain distance at a speed of 18 km/h and returns to the starting point at 12 km/h. If he takes 2 hours 55 minutes for the whole journey, the distance one way is:
(a) 21 km (b) 25 km (c) 18 km (d) 24 km

Q31. A and B start travelling towards each other at the same time at the respective speeds of 10 km/h and 20 km/h. The distance between them is 49 km. What is the distance (in meters) between them before 5 minutes of meeting?
(a) 1600 (b) 1800 (c) 2500 (d) 2000

Q32. Two trains running in the opposite directions cross each other in 12 seconds and they take 60 seconds when they run in the same direction. The possible speeds (m/s) of these two trains can be:
(a) 18,40 (b) 15,45 (c) 20,30 (d) 15,30

Q33. The diameter of a wheel is 70 cm. It completes 600 revolutions in 1 minute. The speed, in km/h, of the vehicle is: (Take $\pi = \frac{22}{7}$)
(a) 78.4 (b) 79.2 (c) 77.8 (d) 78.2

Q34. The speed of a train is 3 times that of a car and 1.5 times that of a steamer A person travelled x km by steamer, 3.75x km by train and $\frac{x}{2}$ km by car. If the speed of the car is 40 km/h and total time taken by him is on $4\frac{1}{2}$ hours, then the total distance travelled by him in three modes is:
(a) 450 km (b) 520 km (c) 480km (d) 420 km

Q35. The ratio of the lengths of train A and B is 5 : 3 and their speeds are in the ratio of 2 : 3. Moving in the opposite direction, Train A took $2\frac{1}{2}$ minutes to cross B. The time (in minutes) taken by train A to cross & stationary pole is:
(a) 2 (b) 3 (c) $\frac{125}{32}$ (d) $\frac{25}{16}$

Q36. Train A takes 9 hours more than train B to cover a distance of 612 km. If its speed is doubled then it takes 3 hours less than the time taken by train B. The speed of the train B is :
(a) 51 km/h (b) 1.2 km/h (c) 40.8 km/h (d) 30.6 km/h

Q.37 A train crosses two platform of length 1000 m and 600 m in 80 seconds and 60 seconds respectively. What is the length of the train ?
(a) 720m (b) 600m (c) 540m (d) 400m

Q38. A train runs 50% faster than a car. Both start running from the same point and meet after covering a distance of 360 km. In the middle of this journey, the train stops for two hours due to some faults in engine. What is the speed of the train?
(a) 80 km/h (b) 60 km/h (c) 72 km/h (d) 90km/h

CPO 2019

Q39. The speed of two railway engines is in the ratio 5:4. If they move on parallel tracks in the same direction and if the slower engine is ahead of the faster engine by 8 km when the latter starts, then how far will the faster engine have to travel before it overtakes the slower one?
(a) 48 (b) 32 (c) 40 (d) 36

Q.40 A person travels a distance of 240 km, partly by train and the rest by bus. He takes $3\frac{1}{2}$ hours if he travels 150 km by train and the rest by bus. If he travels 140 km by bus and the rest by train, he takes $3\frac{2}{3}$ hours. What is the speed of the train?
(a) 72 km/h (b) 75 km/h (c) 80 km/h (d) 70 km/h

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Q41 A person takes 40 minutes more than his usual time when he covers a distance of 20 km at 5 km/hr. If he covers the same distance at 8 km/hr, he takes x minutes less than the usual time. What is the value of x?
(a)48 (b)54 (c)45 (d)50

Q42. The speed of train A is 16 km/h less than the speed of train B. To cover a distance of 384 km, B takes 4 hours less time than A. What is the speed (in km/h) of train B?
(a) 50 (b) 45 (c) 48 (d) 32

Q43. If Abhi travels a certain distance at 6 km/hr, he reaches his destination 12 mins early, but if he travels at 4 km/hr, he reaches his destination 10 minutes late. The speed (in km/h) at which he should travel to reach his destination on time is:
(a) $4\frac{3}{7}$ (b) $4\frac{5}{7}$ (c) $5\frac{4}{4}$ (d) $5\frac{1}{8}$

CGL PRE 2019

Q44. A and B start moving toward each other from places X and Y, respectively at the same time. The speed of A is 20% more than that of B. After meeting on the way, A and B take $2\frac{1}{2}$ hours and x hours now to reach Y and X, respectively. What is the value of x?
(a) $3\frac{3}{5}$ (b) $3\frac{2}{3}$ (c) $3\frac{1}{2}$ (d) $3\frac{2}{5}$

Q45. Two racers run at a speed of 100m/min and 120m/min respectively. If the second racer takes 10 minutes less than the first to complete the run, then how long is the race?
(a) 4 km (b) 6 km (c) 1 km (d) 2 km

Q46. Places A and B are 144 km apart. Two cars start simultaneously, one from A and the other from B. If they move in the same direction, they meet after 12 hours, but if they move towards each other they meet after $\frac{9}{8}$ hours. The speed (in km/h) of the car moving at a faster speed, is:
(a) 70 (b) 72 (c) 60 (d) 64

Q47. Two cyclists X and Y start at the same time from place A to go towards place B at a speed of 6 km/h and 8 km/h, respectively. Despite stopping for 15 minutes during the journey, Y reaches 10 minutes earlier than X. The distance between the places A and B is:
(a) 10 km (b) 16.5 km (c) 6 km (d) 8 km

CHSL 2019

Q48. The distance between the railway stations is 1176 km. To cover this distance, an express train takes 5 hours less than a passenger train while the average speed of the passenger train is 70 km/h less than that of the express train. The time taken by the passenger train to complete the travel is:
(a) 18 hours (b) 23 hours (c) 17 hours (d)12 hours

Q49. The distance between the places H and O is D units. The average speed that gets a person from H to O in a stipulated time is S units. He takes 20 minutes more time than usual if he travels at 60 km/h, and reaches 44 minutes early if he travels 75 km/h. The sum of the numerical values of D and S is:
(a) 358 (b) 384 (c) 376 (d) 344

Q50. Rahul and Mithun travel a distance of 30 km. The sum of their speeds is 70 km/h and the total time taken by both travel the distance is 2 hours 6 minutes. The difference between their speeds is:
(a) 30km/h (b) 25 km/h (c) 20 km/h (d) 35 km/h

Q51. A train takes 45 minutes to cover a certain distance at a speed of 80 km/h. If the speed is increased by 125%, then how long will it take the train to cover 8/5 of the same distance?
(a) 25 min (b) 30 min (c) 32 min (d) 28 min

Q52. Abhi finishes a journey by car in 9 hours. He travels the first half of the journey at a speed of 40 km/h and the second half of the journey at a speed of 50 km/h. The total distance covered is:
(a)200 km (b)100 km (c)300 km (d)400 km

CGL MAINS 2019

Q53. A takes 2 hours more than B to cover a distance 40 km. If A doubles his speed he takes $1\frac{1}{2}$ hours more than B to cover 80 km. To cover a distance of 90 km, how much time will B take travelling at his speed?
(a) $1\frac{1}{8}$ hours (b) $1\frac{3}{8}$ hours (c) $1\frac{1}{6}$ hours (d) 1 hours

Q.54 A delivery boy started from his office at 10a.m. to deliver an article. He rode his scooter at a speed of 32 km/h. He delivered the article and waited for 15 minutes to get the payment. After the payment was made, he reached his office at 11.25 a.m., travelling at a speed of 24km/h. Find the total distance travelled by the boy:
(a) 32km (b) 30km (c) 35km (d)40km

CPO 2020

Q55. A person travels a distance of 300km and then returns to the starting point. The time taken by him for the outward journey is 5 hours more than the time taken for the return journey. If he returns at a speed of 10km/h more than the speed of going. what is the average speed (in km/h) for the entire journey?
(a) 24 (b) 15 (c) 20 (d) 30

Q56. A person covers a distance of 300 km and then returns to the starting point. The time taken by him for the outward journey is 5 hours more than the time taken for the return journey. If he returns at a speed of 10km/h more than the speed of going, what was the speed (in km/h) for the outward journey?
(a) 20 (b) 15 (c) 25 (d) 30

Q57. A takes 2 hours 30 minutes more than B to walk 40km, IF A doubles his speed, then he can make it in 1 hours less than B. How much time (in hours) does A require for walking a 40km distance?

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(a) 5 hours (b) 7 hours (c) 6 hours (d) 5 hours

CGL PRE 2020

Q.58 A 240 m long train overtakes a man walking at 6 km/h, in the same direction, in 9 seconds. How much time (in seconds) will it take to pass a 372 m long tunnel with the same speed?
(a) 21.6 (b) 20 (c) 18 (d) 20.4

Q.59 A train is to cover 370 km at a uniform speed. After running 100 km, the train could run at a speed 5 km/h less than its normal speed due to some technical fault. The train got delayed by 36 minutes. What is the normal speed of the train, in km/h?
(a)45 (b)40 (c)48 (d)50

Q.60 A train runs first 75 km at a certain uniform speed and next 90 km at an average speed of 10 km/h more than the normal speed. If it takes 3 hours to complete the journey, then how much time will the train take to cover 300 km with normal speed?
(a) 5 hours 15 minutes (b)5 hours
(c)6 hours (d)5 hours 25 minutes

Q.61 A train leaves station A at 8 am and reaches station B at 12 noon. A car leaves station B at 8:30 am and reaches station A at the same time when the train reaches station B. At what time do they meet?
(a)9:38 am (b)10:22 am (c)10:08 am (d)9:52 am

Q.62 Akhil takes 30 minutes extra to cover a distance of 150 km if he drives 10 km/h slower than his usual speed. How much Time will he take to drive 90 km if he drives 15 km per hour slower than his usual speed?
(a) 2 h 15 m (b) 2 h (c) 2 h 45 m (d) 2 h 30 m

Q.63 Suman travels from place X to Y and Rekha travels from Y to X, simultaneously. After meeting on the way, Suman and Rekha reach Y and X, in 3 hours 12 minutes and one hour 48 minutes, respectively. If the speed of Rekha is 9 kmh. then the speed (in km/h) of Suman is:
(a)$7\frac{1}{2}$ (b)6 (c)8 (d)$6\frac{3}{4}$

Q.64 If a train runs with the speed of 72 km/h, it reaches its destination late by 15 minutes. However, if its speed is 90 km/h, it is late by only 5 minutes. The correct time to cover its journey in minutes is:
(a)32 (b)40 (c)45 (d)35

Q.65 A takes 2 hours more than B to cover a distance of 40 km. If A doubles his speed, he takes $1\frac{1}{2}$ hour more than B to cover 80 km. To cover a distance of 120 km, how much time in hours) will B take travelling at his same speed?
(a)$1\frac{1}{3}$ (b)$1\frac{2}{3}$ (c)$1\frac{1}{4}$ (d)$1\frac{1}{2}$

Q.66 A car can cover a distance of 144 km in 1.8 hours. In what time (in hours) will it cover double the distance when its speed is increased by 20%?
(a)2.5 (b)3.2 (c)3 (d)2

Q.67 A train running at 48 km/h crosses a man going with the speed of 12 km/h, in the same direction, in 18 seconds and passes a woman coming from the opposite direction in 12 seconds. The speed (in km/h) of the woman is :
(a)8 (b)9 (c)6 (d)10

Q.68 A train covers 450 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less to cover the same distance. How much time will it take to cover 315 km at its usual speed?
(a)7h (b)6h 30m (c)6h 18m (d)7h 52m

CHSL 2020

Q.69 X and Y start at the same time to ride from place A to place B, which is 80 km away from A. X travels 4 km per hour slower than Y. Y reaches place B and at once turns back meeting X, 16 km from place B. Y's speed (in km/h) is:
(a)9 (b)15 (c)8 (d)12

Q.70 A train travels at a speed of 66 km/h and halts at five junctions for a certain time. It covers a distance of 1485 km in one day. For how long (in minutes) does the train stop at each junction, if it halts for the same period of time at all the junctions?
(a)15 (b)18 (c)12 (d)20

Q.71 During his morning walk, Atul walks for 45 minutes at a speed of 8 km h and takes 15 rounds of a park. Shekhar takes 10 rounds of the same park in 40 minutes. What is the speed of Shekhar in km/h?
(a)7.2 (b)6 (c)6.75 (d)7.5

Q.72 Mohan takes 2 hours more than Kishore to walk 63 km. If Mohan increases his speed by 50%, then he can make it in 1 hour less than Kishore. How much time does Kishore take to walk 63 km?
(a) 7 hour (b) 9 hour (c) 6 hour (d) 5 hour

Q.73 A man covers $\frac{5}{12}$ of a total journey by train, $\frac{7}{18}$ of the journey by bus and the remaining 7 km on foot. His total journey (in km) is:
(a) 36 km (b) 35 km (c) 32 km (d) 40 km

Q.74 A bus covered 360 km in 6 hours. If it travels at one-fourth of its usual speed, then how much more time will it take to cover the same distance?
(a)18 hours (b)14 hours (c)12 hours (d)16 hours

Q.75 Two trains start at the same time from two stations and proceed towards each other at speeds of 90 km/h and 70 km/h, respectively. When they meet, it is found that one train has travelled 140 km more than the other. What is the distance (in km), between the two stations?
(a)980 (b)1100 (c)1200 (d)1120

Q.76 A truck covers a distance of 480 km at a certain speed. If the speed is decreased by 8 km/h, it would have taken 2 hours more to cover the same distance. 50% of its original speed (in km/h) is:

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(a)20 (b)40 (c)24 (d)48

Q.77 A car takes 50 minutes to cover a certain distance at a speed of 54 km/h. If the speed is increased by 25%, then how long will it take to cover three-fourth of the same distance?
(a) 35 min (b) 40 min (c) 30 min (d) 25 min

Q.78 Train A takes $1\frac{4}{5}$ h more than the time taken by train B to cover a distance of 360 km. If the speed of train A doubles, it will take 36 min less than the time taken by train B to travel the same distance. What is the speed (in km/h) of train B?
(a) 96 (b) 100 (c) 90 (d) 120

Q.79 A person moved from place A for place B at 2 p.m. at a speed of 4.5 km/h, stayed at place B for 1.5 hours and returned to place A at a speed of 6 km/h. He came back to place A at 7 pm. What is the distance between places A and B (in km)?
(a)$8\frac{1}{3}$ (b)$8\frac{2}{5}$ (c)9 (d)$9\frac{6}{11}$

Q.80 Vaibhav and Vignesh each travel a distance of 78 km such that the speed of Vaibhav is faster than that of Vignesh. The sum of their speeds is 91 km/h and the total time taken by both is 3 hours and 30 minutes. The speed of Vaibhav is:
(a)48 km/h (b)45 km/h (c)52 km/h (d) 54 km/h

Q.81 A man cycles from P to Q. a distance of 30 km, in 2 hours 48 minutes. The road from P is a level road for 18 km and then it is uphill to Q. The man's average speed on the level road is 15 km/h. What is his average uphill speed (in km/h)?
(a) 9 (b) 10.5 (c) 7.5 (d) 12

SSC SELECTION PHASE IX

Q.82 Trains P and Q are running in the same direction on parallel tracks with speeds of x km/h and 90 km/h (90>x), respectively. The faster train passes a man sitting in the slower train in 30 seconds. If the length of train Q is 225 m, then what is the value of x?
(a) 63 (b) 60 (c) 65 (d) 68

Q83. A train takes 1 hour 20 minutes to travel between two stations P and Q. if it travels at $\frac{2}{7}$ of its usual speed, how long will it take to travel between P and Q?
(a) 4 hour 10 minutes (b) 5 hour 20 minutes
(c) 4 hour 40 minutes (d) 3 hour 30 minutes

Q84. A person travels equal distances at speeds of 2km/h, 4 km/h, 5km/h, 7km/h and 12km/h, and takes a total of 1485 minutes. What is the total distance (in km) travelled (to the nearest integer)?
(a) 175 (b) 200 (c) 105 (d) 125

Q85. P and Q travel a distance of 120 km such that the speed of P is faster than Q. the sum of their speeds is 75 km/h and together they took the total time of 6 hours and 40 minutes. Then the speed of Q (in km/h) is:
(a) 40 (b) 42 (c) 30 (d) 25

Q86. A person travelled from a place Z to P at an average speed of 130 km/h. he travelled the first 75% of the distance in two-third of the time and the rest at a constant speed of X km/h. the value of 2X is:
(a) 105 (b) 210 (c) 195 (d) 97.5

Q87. The ratio of the distance between two places A and B to the distance between places B and C is 3 : 5. A man travels from A to B at 30 km/h and from B to C at x km/h. If his average speed for the entire journey is 40 km/h, then what is the value of (x – 7) (in km/h)?
(a) 49 (b) 43 (c) 47 (d) 51

Q88. A and B run on a circular path of perimeter 1200 m at different speeds if they start at the same time and from the same place, but run in opposite directions, they meet for the first time in 3 minutes. If the speed of B is 10.8 km/h, then what is the speed (in km/h) of A?
(a) 12.8 (b) 13.2 (c) 12.5 (d) 13.1

SSC CGL PRE 21

Q89. A motorboat whose speed is 20 km/h in still water takes 30 minutes more to go 24 km upstream than to cover the same distance downstream. If the speed of the boat in still water is increased by 2 km/h, then how much time will it take to go 39 km downstream and 30 km upstream?
a) 2 h 40 m b) 3 h 40 m c) 3 h 10 m d) 2 h 50 m

Q90. A person travels 5x distance at a speed of 5km/h, x distance at a speed of 5 km/h, and 4x distance at a speed of 6 km/h, and takes a total of 112 minutes. What is the total distance (in km) travelled by the person?
a) 8 b) 10 c) 9 d) 12

Q91. Shyam drives his car 30 km at a speed of 45 km/h and , for the next 1 h 20 m, he drives it at a speed of 51 km/h. find his average speed (in km/h) for the entire journey.
a) 49 b) 48 c) 48.5 d) 47

Q92. A takes 3 hours more than B to walk 'd' km. if A doubles his speed, then he can make it in 1 hour less than B. how much time (in hours) does A require to walk 'd' km?
a) 8 b) 5 c) 9 d) 4

Q93. Ram travelled from a place Z to P at an average speed of 130 km/h. He travelled the first 75% of the distance in two-third of the time and the rest at an average speed of X km/h. The value of $\frac{x}{2}$ is:
a) 51 b) 97.5 c) 48.75 d) 19.25

Q94. The distance between two towns is covered in 7 hours at a speed of 50 km/h. By how much should the speed (in km/h) be increased so that 2 hours of travelling time will be saved?
a) 70 b) 20 c) 30 d) 40

Q95. A distance between two stations A and B is 200 km. A train runs from A to B at a speed of 75 km/h, while another train runs form B to A at a speed of 85 km/h. what will be the

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distance between the two trains (in km) 3 minutes before they meet?
a) 5 b) 6 c) 10 d) 8

Q96. Two trains are running on parallel tracks in the same direction at the speed of 80 km/h and 90 km/h, respectively. The trains crossed each other in 3 minutes. If the length of one train is 230 m, then what is the length (in m) of the other train?
a) 270 b) 250 c) 230 d) 300

SSC MTS 2020

Q97. Two clocks were synchronised at 11 am on a Sunday. Thereafter , every day they were, respectively . found to gain and lose one minute per day. What time ,expressed in hours and minutes , will the second clock show when the first clock shows 10 pm on the next Friday?
(a) 9 hours $48\frac{2}{11}$ minutes pm (b) 9 hours $48\frac{7}{11}$ minutes pm
(c) 9 hours $48\frac{1}{11}$ minutes pm (d) 9 hours $48\frac{9}{11}$ minutes pm

Q98. P and Q are two towns. A man drives from P to Q at an average speed of 50km/h. He stops at Q for 4 hours and then heads back to P at an average speed of 40 km/h following the same route. What is his average speed (in km/h correct to two decimal places) if he takes 22 hours for the entire trip?
(a) 48.48 (b) 45.00 (c) 36.36 (d) 42.42

Q99. A man had to travel 49 km, which he divided into six stretches which were exact multiple of either 4 km or 5 km. The first four stretches were 4 km.5 km, 8 km and 10 km, Multiples of 4 km and 5 km were travelled at the rates of 40 and 60 km/h, respectively, and between two consecutive stretches, he rested for six minutes. What was his average speed (in km/h) for the whole journey?
(a) $34\frac{4}{15}$ (b) $34\frac{3}{8}$ (c) $32\frac{4}{13}$ (d) $34\frac{7}{11}$

Q100. In a 200 m walk race, Zakia walks at an average speed of 5 km/h. she gives a start of 20m to Veena and still beats her by 18 seconds. What is the average speed of Veena (in km/h) ?
(a) 3.5 (b) 4.5 (c) 4 (d) 4.2

Q101. A person travels equal distances at speeds of 5 km/h, 8km/h and 10 km/h takes a total time of 2 hours and 33 minutes. the total distance travelled by him was:
(a) 5 km (b) 8 km (c) 10 km (d) 18 km

Q102. When a person travels at 10 m/sec, he reaches the destination on time. He covers $\frac{1}{3}$rd of the distance in $\frac{4}{9}$ of the time. At what speed (in km/h) should he travel to cover the remaining distance to reach the destination on time?
(a) 43.2 (b) 42.8 (c) 44.4 (d) 42.4

Q103. If a train runs with the speed of 72 km/h, it reaches its destination late by 15 minutes. However, if its speed is 90 km/h it is late by only 5 minutes. The correct time to cover its journey in minutes is:
(a) 32 (b) 40 (c) 35 (d) 45

SSC CGL MAINS 2020

Q104. The ratio of the distance between two places A and B to the distance between places B and C is 3 : 5. A man travels from A to B at a speed of x km/h and from B to C at a speed of 50 km/h, if his average speed for the entire journey is 40 km/h, then what is the value of (x -10) : (x + 1)?
(a) 11 : 10 (b) 20 : 31 (c) 10 : 11 (d) 31 : 20

Q105. A student goes to school at a speed of $5\frac{1}{2}$ km/h and returns at a speed of 4 km/h. if he takes $4\frac{3}{4}$ hours for the entire journey, then the total distance covered by the student (in km) is:
(a) 24 (b) 16 (c) 22 (d) 11

DP 2022

Q106. A thief is noticed by a policeman from a distance of 350 meters. The thief and policeman run at speeds of 15 km/h and 20 km/h, respectively. What is the time taken by the policeman to catch the thief?
a) 3 min 45 sec b) 5 min 25 sec
c) 3 min 20 sec d) 4 min 12 sec

Q107. Two trains A and B are running in opposite directions with different speeds. The speed of train B is 18 km/h more than that of A. Train A crosses a pole in 32 seconds and its length is 210 m less than that of train B. if they cross each other in 34 seconds, the length of train A is_____ .
a) 320 m b) 400 m c) 420 m d) 380 m

Q108. A robbery was done by a thief at a jewellery shop and he took 20 kg gold. The shop is 1125 m away from a policeman. The thief starts running at x km/h and the policeman starts chasing at 11 km/h at the same time. The policeman caught the thief in 810 sec. What is the distance run by the thief?
a) 1276 m b) 1375 m c) 1350 m d) 2350 m

CPO PRE 22

Q109. A thief is spotted by a policeman from a distance of 250 m. when the policeman starts the chase, the thief also starts running. Assuming that the speed of the thief is 10 km/h and that of the policeman is 12 km/h, how far would the thief have run before he is caught?
a) 4 km b) 1.25 km c) 3 km d) 2 km

Q110. In journey of three unequal laps, a car covers a distance of 200 km in 4 h in the first lap, while another 162 km at the speed of 15 m/s in the second lap. It covered the remaining distance of the final lap in 4 h such that the average speed of the car for entire journey was 50 km/h. what was the speed of the car in the third lap of the journey?
a) 47 km/h b) 52 km/h c) 42 km/h d) 45 km/h

Q111. A car travels with a speed of 21 m/s in the first 10 minutes, 9.0 km in the next 10 minutes and 10 km in the 10 minutes of its journey. What is the average speed of the car in km/h during its entire journey?
a) 60.0 km/h b) 63.2 km/h c) 62.0 km/h d) 65.3 km/h

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CGL PRE 22

Q112. A thief running at speed of 'x' km/h is chased by a policeman running at a speed of 10 km/h. if the thief is ahead by 100 meters, the policeman catches the thief after 3 minutes. At what speed is the thief running ('x' being the unknown speed)?
a) 4 km/h b) 8 km/h c) 10 km/h d) 6 km/h

Q113. The minute hand of a clock is 20 cm long. Find the area on the face of the clock swept by the minute hand between 8 a.m and 8,:45 a.m.
a) $\frac{6600}{7}$ cm² b) $\frac{6600}{9}$ cm² c) $\frac{6600}{18}$ cm² d) $\frac{6600}{14}$ cm²

Q114. A is chasing B in the same interval of time. A jumps 8 times, while B jumps 6 times. But the distance covered by A in 7 jumps is the same as that of B in 5 jumps. The ratio between the speeds of A and B is _____.
a) 32 : 24 b) 30 : 56
c) 20 : 21 d) 28 : 36

Q115. A car starts from point A towards point B, travelling at the speed of 20 km/h. $1\frac{1}{2}$ hours later, another car starts from point A and travelling at the speed of 30 km/h and reaches $2\frac{1}{2}$ hours before the first car. Find the distance between A and B.
a) 300 km b) 240 km
c) 260 km d) 280 km

Q116. Two trains P and Q start from stations S and T towards each other. Train P takes 4 hours 48 minutes and train Q takes 3 hours 20 minutes to reach T and S, respectively, after they meet. If the speed of train P is 45 km/h, what is the speed of train Q?
a) 48 km/h b) 50 km/h
c) 54 km/h d) 55 km/h

Q117. A starts from a point at a speed of 34 m/s. after 5 seconds, B starts chasing A from the same point at a speed of 44 m/s. What will be the distance travelled by B before A is caught by B?
a) 748 metres b) 862 metres
c) 675 metres d) 549 metres

Q118. Two trains are moving in the same direction at the speed of 36 km/hr and 48 km/hr. The time taken by faster train to cross a man sitting in the slower train is 33 seconds. What will be the length of the faster train?
a) 770 metres b) 90 metres
c) 110 metres d) 180 metres

Q119. Train A running at 81 km/h takes 72 sec to overtake train B, when both the trains are running in the same direction, but it takes 36 sec to cross each other if the trains are running in the opposite direction. If the length of train B is 600 metres, then find the length of train A. (in metres)
a) 600 b) 480 c) 590 d) 900

Q120. A train travels at a speed of 18 m/s in the first 5 minutes, covers 7.5 km in the next 10 minutes and covers 12 km in another 10 minutes. What is its average speed (in km/h, rounded off to 1 decimal place) for the entire journey?
a) 59.8 b) 71.2 c) 45.7 d) 64.6

Q121. Some students went on field trip. At a speed of 6 km/h, they travelled by bikes for 2 hours; then at a speed of 2 km/h, they walked for another hour; then they took rest for an hour and had lunch for half an hour; then at a speed of 1 m/s, they walked for an to visit a garden; and finally at a speed 4 km/h, they returned home in 3 hours. Their average speed, in km/h, (rounded off to two places of decimal) is:
a) 3.48 b) 129.23 c) 0.28 d) 251.62

Q122. A thief steals a bike at 12 : 30 p.m and drives it at 48 km/h. but the theft is discovered after half an hour. The bike owner starts to chase him on another bike at 58 km/h. The Thief will be caught at _____.
a) 3 : 40 pm b) 3 : 54 pm
c) 3 : 10 pm d) 3 : 24 pm

Q123. Vikas covered a certain distance by bike. If he covers 40% of the distance at 40 km/h, 50% of the distance at 25 km/h and the remaining 10% distance at 10 km/h. Find his average speed over the whole distance.
a) 25 km/h b) 28 km/h
c) 26 km/h d) 30 km/h

Q124. A policeman saw a thief from a distance of 450 m. when the policeman started chasing him, the thief also started running. The ratio of speeds of the thief to the policeman is 7 : 8. After running how much distance (in km) can the policeman catch the thief?
a) 3.75 b) 3.4 c) 3.6 d) 3.15

Q125. R jogs at twice the speed of walking and runs at twice the speed of jogging. From his home to office, he covers half of the distance by walking and the rest by jogging. From his office to home, he covers half the distance jogging and the rest by running. What is his average speed (in km/h) in a complete round from his home to office and back home if the distance between his office and home is 10 km and he walks at the speed of 5 km/h?
a) $\frac{90}{8}$ b) $\frac{60}{8}$ c) $\frac{60}{9}$ d) $\frac{80}{9}$

Q126. A train starts from point H towards K at 6:30 Pm with a speed of 90 km/h. Another train starts from point K towards point H at 7:30 Pm with a speed of 72 Km/h. Both the trains meet at point J at 11:30 Pm. What is the Ratio of distance HJ and KJ?
a) 5 : 16 b) 25 : 16 c) 36 : 25 d) 31 : 19

CGL MAINS 2022

Q127 Reshma covers 45 km at a speed of 15 km/h by bicycle, 80 km at a speed of 40 km/h by car, and another 6 km at a speed of 2 km/h on foot. Find her average speed for the whole journey (correct to 2 decimal places).
a) 16.38 km/hr b) 43.50 km/hr
c) 18.36 km/hr d) 15.25 km/hr

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CHSL PRE 2022

Q128 A car travels a distance of 60 km at uniform speed. If the speed of car is increased by 8 km/hr, then it takes 2 hours less to cover the same distance. What is the original speed of the car?

a) 15 km/hr b) 12 km/hr
c) 16 km/hr 4) 10 km/hr

Q129 A car left 60 minutes early than the scheduled time but in order to reach its destination 280 km away in time, it has to slow its usual speed by 14 km/hr. what is the usual speed of the car ?

a) 77 km/hr b) 66 km/hr
c) 70 km/hr d) 63 km/hr

Q130 Vivek starts moving at the speed of 70 km/hr at 8 : 00 am. Neeraj starts moving in the same direction after 4 hours of Vivek at the speed of 120 km/hr. which of the following statement(s) is/are correct ?

1. Neeraj and Vivek meet each other at 5 : 36 pm.
2. Total distance covered by both Neeraj and Vivek till 4 pm is 1080 km.

a) only 2 b) only 1
c) Both 1 and 2 d) Neither 1 and 2

Q131 Two places B1 and B2 are 500 km apart from each other. Sonit and Robin start moving from B1 towards B2 at the same time. After reaching B2, they return back to B1. Speed of Sonit is 80 km/hr more than the Robin. If they meet after 6 hours, then which of the following statement(s) is/are correct ?

I. Distance covered by Sonit is 600 km.
II. Speed of Robin is 120/3 km/hr.

a) Only I b) Both I and II
c) Neither I nor II d) Only II

Q132 If Manoj cycles at 12 kmph instead of 10 kmph, he would have cycled 15 km more. What is the actual distance cycled by him?

a) 75 km b) 120 km
c) 105 km d) 150 km

Q133 Speed of a train is 30 percent more than the speed of a car. Both start from point P at the same time and reach point Q at the same time. P and Q are 130 km apart from each other. On the way train stops for 30 minutes at a station. What is the speed of the train ?

a) 78 km/hr b) 70 km/hr
c) 60 km/hr d) 72 km/hr

Q134 A car moves at the speed of 108 km/hr after repairing and moves at the speed of 72 km/hr before repairing. It covers a distance of x km in 3 hours after repairing. How much time will it take to cover a distance of 5x km before repairing ?

a) 22 hours 30 minutes b) 24 hours
c) 20 hours 40 minutes d) 25 hours 20 minutes

Q135 A bus starts from a bus stand after every 50 minutes in the same direction. Mohit is walking in opposite direction with a speed of 50 km/hr. If Mohit meets each bus in 10 minutes, then what is the speed of bus ?

a) 10.5 km/hr b) 15 km/hr
c) 12.5 km/hr d) 14.5 km/hr

Q136 A 1800 meters long train crosses a man walking in opposite direction in 10 seconds. If the speed of train is 8 times to the speed of man, then what is the speed of train?

a) 576 km/hr b) 640 km/hr
c) 596 km/hr d) 570 km/hr

Q137 Farhan and Aman are going from Delhi to Haryana. The difference and sum of their speeds are 40 km/hr and 60 km/hr respectively. If in a race Farhan can finish 8 minutes earlier than Aman, then find the distance they should cover.

a) 5/3 km b) 8/3 km c) 3/5 km d) 3/8 km

Q138 A person goes to his office by scooter at the speed of 80 km/hr and reaches 60 minutes earlier. If he goes at the speed 50 km/hr, then he reaches 48 minutes late. What will be the speed of the scooter to reach on the usual time?

a) 66 km/hr b) 62 km/hr
c) 64 km/hr d) 60 km/hr

Q139 Two people A and B are at a distance of 220 km from each other at 10 : 30 AM. After 30 minutes, A starts moving towards B at a speed of 40 km/hr while at 12 PM. B starts moving away from A at a speed of 30 km/hr. At what time will they meet on the next day?

a) 6 : 00 AM b) 4 : 00 AM
c) 7 : 00 AM d) 5 : 30 AM

ICAR & Selection Phase XI

Q140 A train takes 18 seconds to pass through a tunnel of length 240 m long and 12 seconds to cross another train of length 270 m long which is moving in the opposite direction at a speed of 54 km/h. The length (in m) of the train is:

1. 160 2. 220 3. 210 4. 180

Q141 A railway passenger counts the telegraph posts near the tracks as he passes them. If they are 50 mts apart and the speed of the train is 48 kmph, then in a minute he will cross?

1. 20 posts 2. 18 posts
3. 17 posts 4. 25 posts

Q142 The speed of a bus is 54 kmph without stoppage and 45 kmph with stoppage. For how many minutes does the bus stop per hour?

1. 20 min 2. 10 min
3. 9 min 4. 15 min

Q143 A policeman follows a thief, who is 1 km ahead of him. The thief and the policeman run at speeds of 8 km/h and 10.5 km/h, respectively. What distance (in km) is run by the thief before he is nabbed by the policeman?

1. 2.5 2. 3.6 3. 4.4 4. 3.2

CGL PRE 2023

Q144 Jehangir had to cover a distance of 90 km in an hour. During the first 25 minutes he travelled at a speed of 15.2 metres per second. How many metres did Jehangir cover per second during the remaining period to reach his destination just on time?

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1. 30.8 2. 32.5 3. 32 4. 31.2

Q145 A policeman saw a thief from 300 metres. The thief started running and the policeman was following him. The thief and the policeman ran at the speed of 8 km/h and 9 km/h respectively. What was the distance between them after 3 minutes?
1. 250 m 2. 300 m
3. 225 m 4. 200 m

Q146 A constable Ram is 225 m behind a thief Somesh. Ram runs 50 m and Somesh runs 30 m in a minute. At what time will the constable Ram catch the thief Somesh?
1. 10 minutes 16 seconds 2. 15 minutes 11 seconds
3. 16 minutes 10 seconds 4. 11 minutes 15 seconds

Q147 Ram rides at the rate of 36 km/h but stops for five minutes to take a drink at the end of every 10 km. Find the time that Ram will take to cover a distance of 84 km.
1. 180 minutes 2. 60 minutes
3. 220 minutes 4. 120 minutes

Q148 Anand covers a certain distance in the first lag of 5 hours at the speed of 50 km/h. in the second lag, he increased the speed by 20% dut to which he covered 20% extra distance than that of the first lag. He covered the third lag at the average speed of the first two lags and covered 10% extra distance than that of the second lag distance. How much total time (in hours) did he take to complete all three lags?
1. 16 2. 15 3. 18 4. 14

Q149 A policeman saw a thief at a distance of 400 m. The thief started running at a speed of 10 km/h and the policeman chased him at a speed of 12 km/h in the same direction. At what distance from the starting point will the policeman catch the thief?
1. 2.4 km 2. 3 km 3. 2 km 4. 2.8 km

Q150. A thief steals an item and escapes, running at 20 km/h. A policeman arrives at the spot of the crime after 6 minutes and immediately starts chasing the thief. 24 minutes after the policeman started to chase the thief, there is still a gap of 400 m between the two. At what distance from the spot of crime would the policeman catch up with the thief, and what is the speed at which the policeman ran?
1. 15 km ; 25 km/h 2. 14.4 km ; 24km/h
3. 10 km ; 25 km/h 4. 12 km ; 24 km/h

Q151 A policeman spots a thief at a distance of 360 m. Both the policeman and the thief simultaneously start running, with the former chasing the latter. While the thief runs at the speed of 8 km/h, the policeman runs at 9.2 km/h. How many metres will the policeman have to run before the catches up with the thief?
1. 2852 2. 2714 3. 2668 4. 2760

Q152 Two motorists start together to travel to a certain destination, one at the speed of 4 km/h and the other at the speed of 6 km/h. Find the distance travelled by them (in km) if the motorist travelling at 4 km/h arrives half an hour after the other motorist.
1. 8 2. 5 3. 6 4. 4

Q153 A certain distance is covered by a person at a certain speed. If another person covers 25% of the distance in triple the time, the ratio of the speed of the first person to that of the second person is:
1. 1 : 6 2. 1 : 12 3. 6 : 1 4. 12 : 1

CHSL PRE 23

Q154. Two cities P and Q are 181 km apart on a straight road. One man starts from P at 8 : 30 A.M. and travels toward Q at 30 km/h. if another man starts from Q at 8 : 54 A.M. and travels towards P at a speed of 35 km/h, then at what time will they meet?
1. 10 : 30 A.M 2. 11 : 00 A.M
3. 10 : 00 A.M 4. 11 : 30 A.M

Q155. A train running at 26.5 km/h takes 18 s to pass a platform. Next, it takes 12 s to pass a man walking at 5 km/h in the opposite direction. Find the length of the platform.
1. 10.0 m 2. 12.5 m 3. 22.5 m 4. 27.5 m

SELECTION PHASE XII

Q156. A train leaves Hyderabad at 4:00 A.M. and reaches Vijayawada at 8:00 A.M. the same day. Another train leaves Vijayawada at 6:00 A.M. and reaches Hyderabad at 9:30 A.M the same day. At what time do the two trains cross each other?
a) 6:45 A.M. b) 7:45 A.M. c) 6:56 A.M. d) 7:56 A.M

Q157. A thief steals an item and escapes, running at 13.5 km/h. A policeman arrives at the spot of the crime after 8 minutes and immediately starts chasing the thief. 28 minutes after the policeman started to chase the thief, there is still a gap of 540 m between the two. At what distance from the spot of the crime would the policeman catch up with the thief, and what is the speed (in km/h) at which the policeman ran?
a) 10.4 km, 16 b) 10.8 km, 16.2
c) 12.96 km, 16.2 d) 11.2 km, 16.4

Q159 A policeman chases a thief on a straight road. The policeman catches the thief in 15 minutes if he drives with a speed of 60 km/h and catches the thief in 0.5 hours if he drives with a speed 45 km/h. What should be his driving speed (in km/h) to catch the thief in just 10 minutes?
a) 75 b) 70 c) 90 d) 65

Q160. A policeman spots a thief from a distance of 100 metres. When he starts running after the thief, the thief starts running as well. How far will the thief have to run before being overtaken if his speed is 8 km/h and the policeman's speed is 10 km/h?
a) 415 metres b) 430 metres
c) 380 metres d) 400 metres

Q161. Ram, standing on a railway platform, noticed that a train took 36 seconds to completely pass through the platform,

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which was 108 m long, and it took 12 seconds in passing him. Find the speed of the train.

a) 18.2 km/h
b) 25.2 km/h
c) 20.2 km/h
d) 16.2 km/h

Q162. A thief is noticed by a policeman from a distance of 500 m. The thief starts running and the policeman chases him. The thief and the policeman run at the speed of 12 km/h and 13 km/h, respectively. What is the distance between them after 12 minutes?

a) 200 m b) 300 m c) 150 m d) 100 m

Q163. P drives a car for 5 hours and after every hour he doubles the speed. In the fifth hour, his speed is 128 km/h. What is his average speed of the journey in km/h?

a) 52.6 b) 62.6 c) 49.6 d) 55.6

Q164. Veena and Karmesh were at different places in Delhi. They fixed a meeting point to meet to settle some issue. Veena started her journey at 8:00 a.m. from place A and reached place B at 4:00 p.m. and Karmesh started moving from place B 2 hours later than the time Veena started and could reach place A at 5:00 p.m. the same day, via the same route. At what time will Karmesh and Veena meet each other?

a) 1:24 p.m.
b) 1:00 p.m.
c) 12:48 p.m.
d) 1:46 p.m.

Q165. A police station, a bank and a safe house for the thief are in a straight line with a bank in between. The distance between the police station and the safe house is four times the distance between the bank and the safe house. After looting the bank at 9:15 A.M, the thief runs away. A policeman gets the information instantly and chases him at the speed of 16 km/h. The policeman catches the thief at the gate of the safe house in fifteen minutes. What is the distance between the bank and the police station?

a) 1. 4 km b) 1 km c) 2 km d) 3 km

CPO 2024

Q166. A thief running at 7 km/h is chased by a policeman whose speed is 12 km/h. If the thief is 280 m ahead of the policeman, then the time required for the policeman to catch the thief will be:

a) $3\frac{9}{25}$ minutes
b) $3\frac{1}{25}$ minutes
c) $4\frac{9}{25}$ minutes
d) $3\frac{2}{25}$ minutes

Q167. Two trains, P and Q, are running on parallel tracks in opposite directions with lengths of 110 m and 140 m, respectively. Train P is running at a speed of 70 km/h and took 5 seconds to cross train Q. The speed of train Q is:

a) 120 km/h
b) 110 km/h
c) 90 km/h
d) 100 km/h

Q168. The distance (d) a moving body travels, varies directly with the time (t) when it moves. A train travels 72 km in 2 hours. Find the equation that relates d and t.

a) d = t + 36
b) d = t - 36
c) d = 36t
d) d = t/36

CHSL 24

Q169. A policeman was asked to chase a thief. Before the policeman started the chase, he realised that the thief was 200 metres ahead of him and was running at a speed of 16 km/h. The policeman started the chase at a speed of 20 km/h. How far will the thief run before he is overtaken by the policeman?

a) 1000 m
b) 700 m
c) 800 m
d) 600 m

Q170. A policeman received information that a thief is at a distance of 1.5 km from him. The thief starts moving by car and the policeman chases him by car. The thief and the policeman are moving at the speeds of 90 km/h and 120 km/h respectively. At what distance (in km) will the police catch the thief?

a) 45.0 km
b) 5 km
c) 6 km
d) 4.5 km

Q171. Two trains of length 310 m and 330 m, respectively, are 160 m apart. They start moving towards each other on parallel tracks, at speeds 130 km/h and 158 km/h, respectively. In how much time (in seconds) will the trains cross each other ?

a) 10 b) 8 c) 12 d) 18

Q172. The speed of a thief is 4/5 times the speed of a policeman. The thief covers a distance of 6 km before he was caught by the policeman in 30 minutes. Initially, what was the distance between the policeman and the thief in km?

a) 0.8 b) 1.0 c) 1.5 d) 1.2

Q173. A motorcycle covered the first 60 km of its journey at an average speed of 40 km/h. The speed of the motorcycle for covering the rest of the journey, i.e. 90 km, was 45 km/h. During the whole journey, the overall average speed of the motorcycle was:

a) 42 km/h
b) $42\frac{1}{2}$ km/h
c) $42\frac{1}{7}$ km/h
d) $42\frac{6}{7}$ km/h

CGL 2024

Q174. Atul gives Vishu a head-start of 20 seconds in a 900 m race and beats him by 135 m. while running the same race again Atul gives a start of 189 m and beats him by 8 seconds. In how much time can Vishu complete the full race of 900 m?

a) 3 minutes 10 seconds
b) 3 minutes 30 seconds
c) 3 minutes 20 seconds
d) 2 minutes 50 seconds

Q175. A thief is noticed by a policeman from a distance of 200 m. the thief starts running and the policeman chases him. The thief and the policeman run at the rate of 10 km/h and 11 km/h, respectively. What is the distance (in metres) between them after 9 minutes?

a) 40 b) 60 c) 50 d) 30

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Q176. Place A and B are 20 km apart on the highway. A car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in one hour. If they travelled towards each other, they met in 12 minutes. What are the speeds (in km/h) of two cars?
a) 60, 40 b) 52, 48 c) 51, 49 d) 55, 45

Q177. Akshara and Siddharth travel from point P to Q, a distance of 72 km at a rate of 8 km/h and 10 km/h, respectively. Siddharth reaches Q first and returns immediately and meets Akshara at R. Find the distance from P to R.
a) 65 km b) 64 km c) 66 km d) 63 km

Answers

1	C	2	A	3	
4		5	B	6	B
7	D	8	D	9	D
10	D	11	A	12	C
13	D	14	B	15	A
16	B	17	C	18	A
19	C	20	D	21	C
22	B	23	B	24	D
25	D	26	B	27	A
28	C	29	C	30	A
31	C	32	C	33	B
34	D	35	C	36	C
37	B	38	D	39	C
40	B	41	D	42	C
43	B	44	A	45	B
46	A	47	A	48	D
49	B	50	A	51	C
52	D	53	A	54	A
55	A	56	A	57	B
58	A	59	D	60	C
61	C	62	B	63	D
64	D	65	D	66	C
67	C	68	A	69	D
70	B	71	B	72	A
73	A	74	A	75	D
76	C	77	C	78	D
79	C	80	C	81	C
82	A	83	C	84	C
85	C	86	C	87	B
88	B	89	C	90	B
91	A	92	A	93	C
94	B	95	D	96	A
97	C	98	C	99	C
100	C	101	D	102	A
103	C	104	B	105	C
106	D	107	A	108	C
109	B	110	A	111	B
112	B	113	A	114	C
115	B	116	C	117	A
118	C	119	B	120	A
121	A	122	D	123	A
124	C	125	D	126	B
127	A	128	B	129	C
130	B	131	C	132	A
133	A	134	A	135	C
136	A	137	A	138	D
139	A	140	C	141	C
142	B	143	D	144	C
145	A	146	D	147	A
148	A	149	A	150	D
151	D	152	C	153	D
154	D	155	D	156	C
157	B	158		159	A
160	D	161	D	162	B
163	C	164	C	165	D
166	A	167	B	168	C
169	C	170	C	171	A
172	C	173	D	174	C
175	C	176	A	177	B

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1.

Dis 384 km.

Speed ↓	Time ↑
16	a
32	4
48	6
64	8

Actual speed = 64

75% → 48 km/h

2.

S_A 1 : 2

T_A 2 : 1 → 1 → $1\frac{1}{2}$ hr

$S_A = 3$ hr

$T_B = 3$ hr − 30 mn = $2\frac{1}{2}$ hr

$S_B = \frac{15}{5/2} = 6$ km/h

3.

$L_T = (44-8)\frac{5}{18} \times 15$

$= 150$ m.

$150 = (44 - S_\omega)\frac{5}{18} \times 10$

$S_\omega = 54 - 44 = 10$ km/h

4.

5.

6.

Speed of B = S

$S_A = S + 25$

$\frac{250}{S} - \frac{300}{S+25} = 4$

S → 25

$S_A = 25 + 25 = 50$ KM/h

7.

$\frac{50-40}{50} \times 60 = 12$

8.

$S_D = \frac{12}{2}[2 \times 35 + (12-1)2]$

$= 6 \times 92 \Rightarrow 552$

9.

$L_T = (x-6)\times\frac{5}{18} \times 20$

↓

$(x-6)\frac{5}{18} \times 20 + 200 = x \times \frac{5}{18} \times 30$

$x = 60$ km/h

10.

$S_A = S$

$S_B = 3S$

$3S = (50+58)\frac{5}{18} \times 15$

$S = 150$ m

11.

$D = 396$

$S_{relative} = \frac{396}{5:5} = 72$

$S_X = 31$ km/hr

$S_Y = 41$ km/h

12.

S 1 : 2

T 2 : 1

→ $\frac{8}{3} + \frac{4}{3} = 4$ hrs.

Time = 2x = 8 hrs.

$S_A = \frac{416}{8} = 52$ km/h

13.

Let D = 100

$S = \frac{100}{\frac{40}{8} + \frac{24}{9} + \frac{36}{12}}$

$= \frac{300}{32}$ km/hr

$= 9\frac{3}{8}$ km/hr

14.

$S_A = x$

$S_B = x - 16$

$\frac{96}{x-16} - \frac{96}{x} = 1$

48 $3 - 2 = 1$ (Satisfied)

15.

45 : 48 (T)

16 : 15 (S)

1 → 5

80 km/h $(\frac{45}{60})$

= 60 km.

16.

$D = \frac{S_1 S_2}{S_1 - S_2} \cdot \Delta t$

$25 = \frac{S_1 S_2}{S_1 - S_2} \cdot \frac{25}{60}$

$\frac{1}{60} = \frac{1}{S_1} - \frac{1}{S_2}$

$\frac{1}{S_1} - \frac{1}{S_2} = \frac{1}{60} \times \frac{18}{5} = \frac{3}{50}$

17.

$D = 162 \times \frac{5}{18} = 45$ m/s

So 45 meter.

45 covered by 90 km/h

$T = \frac{45}{90 \times 5} \times 18 = \frac{9}{5}$ sec.

18.

48 64

4 3

1 → 12 − 3 = 9

36 min but late by 12 min

actual time = 36 − 12 = 24 min

19.

52 65

(T) 5 4

1 → 15 − 5 = 10

50 min but late by 15 min

actual time = 50 − 15 = 35 min

20.

Total Dis = 500 + 500

= 1 km

$\frac{1}{12/60} = \frac{60}{12} = 5$ km/hr

21.

P 6 am — 2 PM (8 hr)

Q 8 am — 3 PM (7 hr)

Speed ratio

7 : 8, Distance = 56

Dis by P in 2 hrs (6 am − 8 am)

7 × 2 = 14

$8:00\text{ am} + \frac{56-14}{15} = \frac{42}{15} = 10:48$ am

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22.

From P 9:00 AM (T_1)
30 KM/hr

From Q 11:00 Am (T_2)
45 km/hr

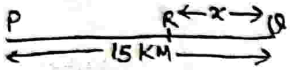
$D_{T_1} = 2 \text{ hrs} \times 30 = 60 \text{km}$

$\frac{300-60}{30+45} = \frac{16}{5}$ hr

$\left(2+\frac{16}{5}\right)30 : \frac{16}{5} \times 45$

13 : 12

23.



Aman Raman

D (15−x) (15+x)

distance covered in same time

$\frac{15-x}{6} = \frac{15+x}{9}$

$x = 3$

$PR = 15-3 = 12$

24.

$\frac{3+9+6}{\frac{3}{9}+\frac{6}{15}+\frac{9}{18}} = \frac{D}{T} = S$

$\frac{18 \times 30}{37}$ km/hr

25.

$S_C = \frac{600}{60} = 10$ m/sec.

Sprinter $S_S = \frac{100}{9.6}$ m/sec.

Diff $\frac{100}{9.6} - 10$

$= \frac{4}{96} = \frac{40}{96} \Rightarrow \frac{5}{12}$

26.

$60 = \frac{2 \times 40 \times x}{40+x}$

$120+3x = 4x$

$120 = x$

27.

$\frac{A}{B} = \frac{10}{9}$, $\frac{B}{C} = \frac{10}{9}$

10 9
10 9
100 90 81

19 m

28.

$64 = \frac{2 \times 60 \times S}{(60+S)}$

$60+S = 5S$

$60 = S$

29.

$\frac{2D}{\frac{D}{40}+\frac{D}{60}} = S$

$\frac{2 \times 120}{5} \times 16 \text{hr} = D$

768 km

30.

Sag. $\times T = D$

$\frac{2 \times 18 \times 12}{8} \times 2\frac{11}{12}$

$= 42$ KM

one way $= 21$ KM

CurrentMUDDE

31.

Relative Speed
$10+20 = 30$ KM/hr.

$D = (30 \text{ KM/h}) \times 5 \text{ min}$

$= 30 \times \frac{5}{18} \times 5 \times 60$

$= 2500$ m.

32.

$\frac{\frac{D}{12}}{\frac{D}{60}} = \frac{x+y}{x-y}$

$\frac{5}{1} = \frac{x+y}{x-1}$

$\frac{x}{y} = \frac{30}{20}$

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33.

$2 \times \frac{22}{7} \times 35 = \frac{600}{60} \times \text{Speed (m)}$

$220 = S(m)$

$220 \times \frac{18}{5} = S(km)$

79.2 km/hr

34.

$\frac{x}{2} + \frac{15x}{12} + \frac{x}{2} = \frac{9}{2}$

$\frac{D}{S} = T$

Train	Car	Steamer
3	1	2

$\frac{9x}{4} = \frac{9}{2}$

$x = 2$

$5.25 \times 2 = 10.5$

$\frac{x}{2}$ km → 1 km by 40 km/h
$T = 1/40$

$D = \frac{10.5}{1/40} = 420$

35.

Length	5x	3x
Speed	2y	3y

$8x = 5y \times \frac{5}{2}$

$\frac{x}{y} = \frac{25}{16}$

$5 \times 25 = 32 \times T$

$T = 125/32$

36.

SA 1 : 2

TA 2 : 1

1 → 9+3 = 12

$T_A = 24$ hrs

$T_B = 24-9 = 15$ hrs

$\frac{612}{15} = 40.8$ km/hr

37.

$\frac{1000+LA}{600+LA} = \frac{S_A \times 80 \text{ sec}}{S_A \times 60 \text{ sec}}$

$3L+3000 = 4L+2400$

$L = 600$

38.

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Car : Train.
$2x$ $3x$
T 3 2
1 → 2

$T_{train} = 4hr$

$D = 4 \times 3x = 12x$
↓
360

$3x = 90$

39.

$5x : 4x$

$\frac{8}{5x-4x} = \frac{8}{x}$

$S = \frac{5x \times 8}{x} = 40$

40.

Train	Bus	Time	
150	90	7/2	— ①
100	140	11/3	— ②
[−50	+50	$-\frac{1}{6}$] $\times \frac{9}{5}$	— Ⓐ

$\boxed{A} \times \frac{9}{5}$ — ①

$(90-150)km$ 0 $\frac{3}{10} - \frac{7}{2}$

$\frac{32}{10}$ Time → 240 Km (by train)

$S_T = \frac{240}{32} \times 10 = 75 km/hr$

41.

$\frac{20}{5} = 4hr = 240$ min but late by 40 min

actual time = 200 min
$\frac{20}{8} \times 60 min = 150 min$) $x = 50 min$

42.

$T_A = S-16$, $T_B = S$

$\frac{384}{S-16} - \frac{384}{S} = 4$

by option $S = 48$ km/hr

43.

6 : 4
T 2 : 3
① → $(12+10) = 22$

Time $= 22 \times 2 = 44$ min
actual time $= 44+12 = 56$ min

Actual Speed → $\frac{44 \times 6}{56}$

44.

$\frac{S_A}{S_B} = \sqrt{\frac{T_B}{T_A}}$

$\frac{6}{5} = \sqrt{\frac{x}{5/2}}$

$3\frac{3}{5} = \frac{18}{5} = x$

45.

100 120
6 5
1 → 10 min
↓
60 min

$\frac{100}{1000}\left(\frac{km}{m}\right) \times 60 min$
$= 6 Km$

46. CurrentMUDDE

C_1 C_2, $D = 144$

$C_1 - C_2 = 144/12 \Rightarrow 12$

$C_1 + C_2 = 144/9/8 = 128$

$C_1 = \frac{128+12}{2} = 70$

47.

S 6 : 8
T 4 3
1 → 25
↓
100 min

$\frac{6 \times 100}{60} = 10 KM$

48.

$T_{Exp} = S+70$

$T_P = S$

$\frac{1176}{S} - \frac{1176}{S+70} = 5$
↓
98

$\frac{1176}{98} = 12 hr$

49.

H ——— D
← D →

S 60 : 75
T 5 : 4
1 → 20+44

$D = \frac{64 \times 5}{60} \times 60 = 320 KM$

now Actual speed (S) $= \frac{320}{(320-20)/60} = 64$

$D+S = 320+64 = 384$

50.

$\frac{30}{x} + \frac{30}{70-x} = \frac{21}{10}$
↓ 150 ↓ 20 (Satisfied)

diff = 30

51.

80 Km/h → 180 km/hr
×225%

$D = 80 \times \frac{3}{4} = 60$

new distance $= 60 \times \frac{8}{5}$
$= 96$

$T = \frac{96}{180} \times 60 = 32 min$

52.

$S_{avg} = \frac{2S_1S_1}{S_1+S_2}$

$D = \frac{2S_1S_1}{S_1+S_2} \times T$

$= \frac{2 \times 40 \times 50}{90} \times 9$

$= 400 KM$

53.

Ⓐ +2hr
→ +3/4 hr
B

80KM → 3/2
40KM → 3/4

S_A 1 : 2
T_A 2 : 1
① → $2 - \frac{3}{4} = \frac{5}{4} hr$
↓
5/2 hrs.

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$T_A = 2.5\text{hr} = 90\text{min}$

$2\text{hr} \to 40\text{KM}$

$30\text{min} \to 20\text{ KM}$

$1\text{hr} \to 80\text{ KM}$

$T = \frac{90}{80} = 1\frac{1}{8}\text{ hrs.}$

54.

$S_{avg} = \frac{2 \times 32 \times 24}{56} = \frac{192}{7}$

Actual time $1\text{hr } 25\text{min} - 15\text{min} = 70\text{min}$

$\frac{192}{7} \times \frac{70}{60} = 32\text{ KM}$

55.

$\frac{300}{S} - \frac{300}{S+10} = 5$

$S = 20$

$\frac{2 \times 20 \times 30}{50} = 24\text{ km/hr}$

56.

$\frac{300}{x} - \frac{300}{x+10} = 5$

by option $= 20$

57.

$S_A : 1 : 2$

T_A $2 : 1 \to 3\frac{1}{2} = \frac{7}{2}$

$\frac{7}{2} \times 2 = 7\text{ hrs}$

58.

$240 = (S-6)\frac{5}{18} \times 9$

$S = 102\text{ km/hr}$

now $\to \frac{(240+372)}{102 \times 5} \times 18$

59.

100 | 270

$\frac{270}{S-5} - \frac{270}{S} = \frac{3}{5}$

$S = 50\text{ KM/hr}$ [by option]

60.

$\frac{75}{S} + \frac{90}{S+10} = 3\text{ hrs}$

$S = 50$ [by value putting]

$T = \frac{300}{50} = 6\text{ hrs.}$

61.

8 — 12 = 4 hrs.

8:30 — 12 = $3\frac{1}{2}$ hrs.

T $4 : 3\frac{1}{2}$ $D = 28\text{ KM}$

S $7 : 8$

D_A in 30 min $7 \times \frac{1}{2} = 3.5$

rem $= 28 - 3.5 = 24.5$

now $\frac{24.5}{15}$ 1hr 38 min

8:30 am + 1:38 hr. = 10:08 am

62.

$\frac{150}{S-10} - \frac{150}{S} = \frac{1}{2}$

$S = 60$

$T = \frac{90}{60+15} = 2\text{ hrs.}$

CurrentMUDDE

63.

Speed of Suman $= x$

Rekha $= 9$

$\frac{x}{9} = \sqrt{\frac{108}{192}}$

$x = \frac{3}{4} \times 9 = 6\frac{3}{4}\text{ KM/hr}$

64.

72 90

$T = 5 : 4$

$1 \to 15 - 5 = 10\text{ min}$

60 min but late by 15 min

So Act. time $50 - 15 = 35$

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65.

2 hrs (A)

3/4

B

40 km → 3/2 ↑

80 km → $\frac{3}{4}$ more

S_A $1 : \frac{1}{2}$

T_A $2 : 1 \to 2 - \frac{3}{4} = 5/4$

2.5 hrs.

$T_B = 2.5\text{ hrs} - 2 = 30\text{ min}$

$S_B = \frac{40}{\frac{1}{2}} = 80\text{ km/hr}$

$T = \frac{120}{80} = 1\frac{1}{2}\text{ hrs.}$

66.

Speed 5 : 6

Time 6 : 5

1.8 hr 1.5 hrs.

144 km in 1.5 hrs.

288 KM in 3 hrs.

67.

$L_T = (48-12)\frac{5}{18} \times 18$

$= 180\text{ m}$

$180\text{m} = (48 + S_w)\frac{5}{18} \times 12$

$S_w = 54 - 48 = 6\text{ km/hr}$

68.

5 km/hr. ↑ 1 hrs. ↓

10 2

15 3

45 9

-5 50 10

Actual Speed = 45

$T = \frac{315}{45} = 7\text{ hrs.}$

69.

A 80 KM B

16

Meeting point

x : y

80 − 16 : 80 + 16

64 : 96 km

Speed 2 : 3

$S_y = 3 \times 4 = 12$

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70.

If travel without any halt in one day

$64 \times 24 = 1584$ km

Diff $1584 - 1485 = 99$ km

Time of halt $\Rightarrow \frac{99}{66} \times 60 = 90$ min

5 halt = 90 min

1 halt = 18 min

71.

$D = \frac{8 \times 3}{4} = 6$ KM (15 seconds)

$S = \frac{6}{15} / \left(\frac{40 \times 1}{60\ 10}\right)$

$= 6$ km/hr

72.

$S_M \Rightarrow 2:3$

$T_M \Rightarrow 3:2$

$1 \rightarrow 1+2=3$

$S_M = 3 \times 3 = 9$ hrs

$T_K = 9 - 2 \Rightarrow 7$ hrs

73.

rem distance :-

$1 - \left(\frac{5}{12} + \frac{7}{18}\right)$

$\frac{7}{36} \rightarrow 7$

$36 \rightarrow 36$ KM

74.

S 4 : 1

T 1 : 4

1 → 6 hrs. (3 more)

3 → $6 \times 3 = 18$

75.

Speed ration = Distance ratio

9 : 7

$2 \rightarrow 140$

$16 \rightarrow 1120$ KM

76.

8 km/hr ↓	2 hrs ↑
16	4
24	6
32	8
40 →	10
48 →	12

actual speed $\frac{48}{2} = 24$ KM

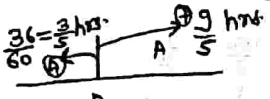
77.

$D = 54 \times \frac{5}{6} = 45$ KM

$T = \left(45 \times \frac{3}{7}\right) / \left(54 \times \frac{5}{4}\right)$

$= \frac{1}{2}$ hr or 30 min

78.



$S_A = 1:2$

$T_A = 2 \rightarrow 1 \rightarrow \frac{9}{5} + \frac{9}{5} = \frac{18}{5}$

$T_B = \frac{18}{5} - \frac{9}{5} = \frac{24-9}{5} = 3$ hrs.

$S_B = \frac{360}{3} = 120$ KM/hr

79.

$\text{Savg} = \frac{2 \times 9 \times 6}{2} \times (5 - 1.5)$

10.5

Total Dis. = 18KM

One side = 9 KM

80.

Vaibhav > Vignesh

Let Svaibhav = x

Svig. = $91 - x$

$\frac{78}{x} + \frac{78}{91-x} = \frac{7}{2}$

By option $x = 52$ KM/hr

81.

$2\frac{48}{60} = 2\frac{4}{5}$

$T_P = \frac{18}{15} = \frac{6}{5}$

$\frac{14}{5} - \frac{6}{5} = \frac{8}{5}$ hr

$\frac{8}{5} \times$ speed $= 12$ KM

$S = 7.5$

82.

$225 = (90 - x)\frac{6}{10} \times 30$

$x = 90 - 27 = 63$ km/hr.

83.

S 7 : 2

T 2 : 7

$\times 2/3$

$\frac{4}{3}$ $\frac{14}{3}$

4 hr $+ \frac{2}{3} \times 60$ min

4 hr $+ 40$ min

84.

$D = 5D$ [Let]

$D \Rightarrow \frac{5D}{\frac{D}{2} + \frac{D}{4} + \frac{D}{5} + \frac{D}{7} + \frac{D}{12}} \times \frac{1484}{60}$

$\frac{5 \times 420 \times 1484}{494 \times 60} \backsim 105$ KM

85.

$P > Q$, $P = x$ (speed)

$\frac{120}{x} + \frac{120}{75-x} = \frac{20}{3}$

$x = 90$

$45 = Q$

86.

Let $D = 390$

$T = 3$ hrs.

2 hr 1 hr

25% distance

$x = \frac{390 \times 1}{1 \text{ hr.} \frac{1}{4}}$

$2x = \frac{390}{2} = 195$

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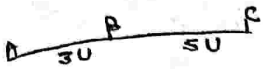
87.

A — 3U — B — 5U — C



$S = \frac{D}{T}$

$40 = \frac{8}{\frac{3}{30} + \frac{5}{x}}$

$5 = \frac{1}{\frac{1}{10} + \frac{5}{x}}$

$x = 50$

88.

$1.2\,KM = (S + 10.8)\frac{3\,min}{60}$

$S = 24 - 10.8$
$= 13.2$

89.

20 Km/h = Speed of boat in still water
x = Speed of current

$\frac{24}{20-x} - \frac{24}{20+x} = \frac{1}{2}$

$\boxed{x=4}$, $x+2=6$

$\frac{39}{24+2} + \frac{39}{16}$

$(1hr.30min) + 1hr + \frac{7}{6} \times 60min$

Total time = 3h 10 m.

90.

$\frac{5x + x + 4x}{\frac{5x}{5} + \frac{x}{5} + \frac{4x}{6}} \times \frac{112}{60} = D$

$\frac{10x}{28x/15} \times \frac{112}{60} = D$

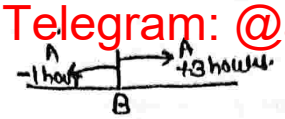
$10 = D$

91.

$\frac{30 + (51 \times \frac{4}{5})}{\frac{80}{45} + \frac{80}{60}}$

$\frac{98 \times 3}{6} = 49$ Km/hr

92.



A — -1 hour — A — +3 hours — B

S_A 1 : 2
T_A 2 : 1
1 → 4

$T_A = 8$ hrs.

93.

Let D = 390 KM
S = 130 KM/hr
So Time = 3 hrs.
2hr 1hr

$\frac{390}{1} \times \frac{1}{4} = x$

$\frac{97.5}{2} = \frac{x}{2}$

$= 48.75$ km/hr

94.

Time
7 : 5
S 5 : 7
2
50

diff = → 10×2=20

95.

$S_{relative} = 85 + 75$
$= 160$ KM/hr

$D = 160 \times \frac{3}{60}$
$= 8$ KM

96.

$L_1 = 230$ M
$L_2 = x$ m

$230 + x = (90-80) \times \frac{5}{18} \times 3 \times 60$

$x = 500 - 230$
$= 270$ m

97.

Sun 11 to Fri 10pm
= 131 h

1st Clock = +1 min/Day
2nd " = −1 min/Day

1st ⇒ $24h + \frac{1}{60}h$
$= \frac{1441}{60}h$

2nd = $24h - \frac{1}{60}h = \frac{1439}{60}h$

In 131h = $\frac{1441}{60} \div \frac{1439}{60}$

⇒ $\frac{131 \times 1439}{1441}$

$= \frac{1439}{11} = 130\frac{9}{11}h$

Sun 11 am + $130\frac{9}{11}h$ = Fri $9\frac{9}{11}$ p.m
9h $48\frac{1}{11}$ min

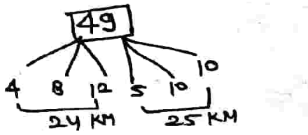
98.

98] 50KM/h : 40KM/hr
4 : 5
4+5=9 → 18 hrs
8hr

Dis = 400
Speed = $\frac{400}{}$ =

99.

$\boxed{49}$
4 8 12 5 10 10
24 KM 25 KM
40KM/hr 60KM
5 gap → 5×6 = 30 min



$\frac{49}{\frac{24}{40} + \frac{25}{60} + \frac{30}{60}}$

$= \frac{49 \times 60}{36 + 25 + 30}$

$= \frac{49 \times 60}{91} \Rightarrow 32\frac{4}{13}$

100.

Z = 200
V = 180

$T_Z = \frac{200}{5 \times \frac{5}{18}} = 144$ sec.

$T_V = 144 + 18 = 162$ sec.

$S_V = \frac{180}{162} \times \frac{18}{5}$
$= 4$ km/hr

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101.

Let D = 3

$\frac{3}{\frac{1}{5}+\frac{1}{8}+\frac{1}{10}} \times \frac{51}{20}$

$\frac{3\times40}{17}\times\frac{51}{20}$

= 18 KM.

102.

D = 90 m

T = 9 sec.

4 sec. 5 sec

30 m (90−30) = 60

$S = \frac{60}{5}\times\frac{18}{5} = 43.2$

103.

72 : 90

T 5 : 4

1 → 15−5 = 10

50−15 = 35 min

104.

Let D = 8

$40 = \frac{8}{\frac{3}{x}+\frac{1}{10}}$

$5 = \frac{10x}{30+x}$

x = 30

x−10 : x+1

$\boxed{20 : 31}$

105.

$S_{avg} = \frac{2\times\frac{11}{2}\times4}{\frac{19}{2}}$

$D = \frac{44\times2}{19}\times\frac{19}{4}$

= 22 KM

106.

$\frac{350\times18}{(20-15)\times5}$

$= \frac{350\times18}{5\times5}$

= 252 sec

= 4 min 12 sec

107.

18 km/h = 5 m/s

A	B
x	x+5
y	y+210

$x = \frac{y}{32}$

$2x+5 = \frac{2y+210}{34}$

$2\times\frac{y}{32}+5 = \frac{2y+210}{34}$

$\frac{y+80}{16} = \frac{2y+210}{34}$

y = 320 m

108.

$\frac{1125\times18}{(11-x)\times5} = 810$

11 − x = 5

x = 6 km/h

$Dis = 810\times6\times\frac{5}{18}$

= 1350 m

109.

CurrentMUDDE

$= \frac{250\times18}{(12-10)\times5}$

$= \frac{250\times18}{2\times5}$

= 450 sec

$Dis = 450\times10\times\frac{5}{18} = 1250\,m$

= 1.25 km

110.

1st = 4h

2nd = $\frac{162\times5}{15\times18}$ = 3h

3rd = 4h

Total time = 11h

Total Dis = 200 + 162 + x = 362 + x

$50 = \frac{362+x}{11}$

x = 188

Speed 3rd = $\frac{188}{4}$ = 47 km/h

111.

1st Dis = $21\times\frac{18}{5}\times\frac{10}{60} = \frac{63}{5}$

= 12.6

$Avg = \frac{(12.6+9+10)\,km}{30\,min}$

$= \frac{31.6\times60\,km/h}{30}$

= 63.2 km/h

112.

$\frac{100}{3\times60}\times\frac{18}{5}$ = 2 km/h Relative Speed

T. speed = 10 − 2

= 8 km/h

113.

Angle = 6×45

= 270°

$Area = \frac{\pi\times r^2\theta}{360}$

$= \frac{22}{7}\times400\times\frac{270}{360}$

$= \frac{6600}{7}\,cm^2$

114.

Dis ∝ Speed

7 JA = 5 JB

8 JA = 6 JB

$8\,JA = 6\times\frac{7\,JA}{5}$

40 : 42

20 : 21

115.

Let A reach after t hours.

$20\times t = 30\left(t-\frac{5}{2}-\frac{3}{2}\right)$

20t = 30(t − 4)

2t = 3t − 12

t = 12

D = 20×12 = 240 km

116.

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$$\frac{P_S}{Q_S} = \sqrt{\frac{QT}{PT}}$$

$$\frac{45}{Q_S} = \sqrt{\frac{4+\frac{48}{60}}{3+\frac{20}{60}}} = \sqrt{\frac{\frac{24}{5}}{\frac{10}{3}}}$$

$$\frac{45}{Q_S} = \sqrt{\frac{25}{36}} = \frac{5}{6}$$

$Q_S = 54$ km/h

117.

$Q = 34 \times 5$
$= 170$ m

$T = \frac{170}{(44-34)} = 17$ Sec

Dis B $= 17 \times 44$
$= 748$ m

118.

$(48-36) \times \frac{5}{18} \times 33$

$= 12 \times \frac{5}{18} \times 33$

$= 110$ m

119.

A = 81km/h
B = x km/h

$(81-x)72 = (81+x)36$
$3x = 81$
$x = 27$

(A+B) length $= (81-27)\frac{5}{18} \times 72$
$= 1080$

B = 600
A = 1080 - 600
= 480

120.

Total Distance
$= 18 \times 5 \times 60 + 7500 + 12000$
$= 24900$ m

T. time $= 5 + 10 + 10$
$= 25 \times 60$ Sec

Avg $= \frac{24900}{25 \times 60} \times \frac{18}{5}$

$= \frac{498 \times 12}{100}$

$= 59.76$

≈ 59.8

121.

Dist $= 2 \times 6 + 2 \times 1 + 1 \times \frac{18}{5} \times 1 + 3 \times 4$
$= 26 + \frac{18}{5} = \frac{148}{5}$

Time $= 2 + 1 + \frac{3}{4} + 1 + 3 = \frac{17}{2}$ h

Avg speed $= \frac{148 \times 2}{5 \times 17} = 3.48$

122.

Dis $= 48 \times \frac{1}{2} = 24$ km

$24 = (58-48)t$

$t = 2.4 = 2$ h 24 min

meeting time $= 12:30 +$
2 h 24 min + 30 m
$= 2:54 + 30$ min
$= 3:24$ PM

123.

Let Dist $= 10d$

$= \frac{10d}{\frac{4d}{40} + \frac{5d}{25} + \frac{d}{10}}$

$= \frac{10d}{\frac{20d + 40d + 20d}{200}}$

$= \frac{10 \times 200}{80}$

$= 25$ km/h

124.

$= \frac{450}{(8x-7x)} \times 8x$

$= \frac{450 \times 8x}{x \times 1000}$

$= \frac{18}{20}$

$= 3.6$

125.

W	J	R
5	10	20

Total Dis $= 10 + 10$
$= 20$ km

Total time $= \frac{5}{5} + \frac{5}{10} + \frac{5}{10} + \frac{5}{20}$

$= 2 + \frac{1}{4} = \frac{9}{4}$

Avg sp $= \frac{20 \times 4}{9}$
$= \frac{80}{9}$

126.

1st train Distance H tak
Sp = 90 km/h
t = 6:30 to 11:30
= 5 h
D $= 90 \times 5 = 450$ km

0nd $72 \times 4 = 288$

450 : 288
25 : 16

127.

Total Dis $= 45 + 80 + 6$
$= 131$ km

II Time $= \frac{45}{15} + \frac{80}{40} + \frac{6}{2}$
$= 8$ h

Avg Sp $= \frac{131}{8} = 16.38$ km/h

128.

From Option
Let original Speed = 12km/h
Time = 60/12 = 5hr
If speed increases by 8km/h
Then increased speed is 20km/h

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Time taken = 60/20 = 3 hr
So original speed = 12 km/h

Or

$$\frac{S(S+8)}{8} \times 2 = 60$$

$$S = 12$$

129.

$$\frac{S(S-14)}{14} = 280$$

$$S = 70$$

130.

Dis = 70×4 = 280
Relative Sp = 120 − 70 = 50
time = 280/50 = 5·36
12 + 5·36 = 5:36 PM IL

Dis till 4:00 pm
Till 12, 12:00 PM = 280
In 4 h = 50×4 = 200 km
Dis = 280 + 200 = 480 × II

131.

$$6[x+x+80] = 2\times500$$

$$x = \frac{130}{3} = \text{Robin } x$$

Dis = 260
Somit = 1000 − 260 = 740 · x

132.

Speed 10 12
Dis 10 12
2 — 15
10 — 15×10/8
= 75

133.

T C
13 10 Speed
10 13 Time
3 — 30 min
100
Speed T = 180/100 × 60 = 78

134.

After = 108
Before = 72
Distance after = 108×3
x = 5x = 108×3×5
Time = 108×15/72
= 22 h 30 min

135.

50×10 : 40×x
x = 12·5

136.

T : m
8x : x
1800/9x = 10
x = 20
T = 8×20×18/5
= 576 km/h

137.

F + A = 60
F − A = 40
F = 50, A = 10 Speed
Time = 10 : 50
1 : 5
4 → 8
1 — 2
Dis = 50×2/60 = 5/3

138.

Speed 80 50
Time 5 8
3 — 60+48
5 — 240
Dis = 180×80/60 = 240
Real Sp = 240/240 × 60 = 60 km/h

139.

220
A B
At 12 PM A's Dis = 40 km
Rem Dis = 220 − 40
= 180

180/40−30 = 18 h ⇒ 12 PM + 18 h
6 AM

140.

$\frac{x+240}{18} \Rightarrow 1^{st}$

$2^{nd} = \frac{54\times5}{18} = 15$ mps

$\frac{x+270}{12} = \frac{x+240}{18} + 15$

x = 210

141.

Speed = 48×5/18 m/s
Distance in 1 min = 48×5×60/18
No of post = 48×5×60/18×50 + 1
= 17 post

142.

Diff of Speeds / Speed without Stoppage.
= (54 − 45)/54 h
= 9/54 × 60
= 10 min

143.

Time = 1/10·5 − 8
= 2/5 h
Distance = 8×2/5
= 3·2 km.

144.

D = 25×15·2×60/1000
= 22·8 km
Remaining D = 90 − 22·8
= 67·2 km
= 67·2/(60−27) × 1000/60
= 32 m/s

145.

(9 − 8)×5/18 × 3×60 = 50m
Diff = 300 − 50
= 250

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146.

$Q = 225m$

$\frac{225}{50-30} = \frac{225}{20}$

11 min 15 sec

147.

$Q = 84$

Time in hart $= 8 \times 5 = 40$ min

$\frac{84}{36} \times 60 = 140$ min

$= 140 + 40 = 180$ min

148.

	I	II	III
D	250	300	330
S	50	60	Avg ⇒ 55
T	5	5	$\frac{330}{55} = 6$

Total time $= 5 + 5 + 6$

$= 16h.$

149.

$T = \frac{400 \times 18}{2 \times 5} = 720$ Sec

$Q = \frac{12 \times 720}{60 \times 60} = 2.4$ km

150.

Speed of Police $= x$

$(x-20) \times \frac{24}{60} = \frac{1600}{1000}$

$x = 24$ km/h

Dis by thief in 6 min $= 6 \times \frac{20}{60}$

$= 2$ km

Dis by Police $= \frac{2}{(24-20)} \times 24$

$= 12$ km

151.

$T = \frac{360}{9.2 - 8}$

$= 300$

Dis by police

$= 300 \times 9.2$

$= 2760$ m

152.

4 : 6 Speed

2 : 3

3 : 2 — time

1 — 30 min

2 → 60 min

Dis $= 6 \times 1 = 6$ km

153.

Dis — $4x$

T — T

2nd Dis $= 4x \times 25\% = x$

$T = 3T$

$\frac{4x}{T} : \frac{x}{3T} = 12 : 1$

154.

Dis in 24 min $= 30 \times \frac{24}{60} = 12$

Rem Dis $= 181 - 12 = 169$

Time $= \frac{169}{30+35} = 2h + \frac{39}{65} \times 60$

$= 2h\ 36$ min

8:54 + 2h 36 min

$= 11:30$ AM

155.

CurrentMUDDE

Length of train $= (26.5+5) \times \frac{5}{18} \times 12$

$= 105$

$105 + x = 26.5 \times \frac{5}{18} \times 18$

$x = 27.5$ m

156.

A	B	
4h	3.5h	Time
3.5	4	Speed

Total Distance $= 4 \times 3.5$

$= 14$

A's Dis $= 3.5 \times 2$

At 6:00 am $= 7$ km

$\frac{14-7}{7.5} \times 60 = 56$ min

6:56

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157.

Police Speed $= x$ m/s

Thief " $= \frac{135}{10} \times \frac{5}{18} = \frac{15}{4}$

Rel. " $= \frac{4x - 15}{4}$ m/s

8 min Thief Dis $= \frac{15}{4} \times 8 \times 60 =$

$= 1800$ m

Rem $= 1800 - 540 = 1260$ m

28 min

$\frac{1260}{\frac{4x-15}{4}} = 28 \times 60$

$x = \frac{9}{2}$ m/s $= 16.2$ km/h

Time $= \frac{1800}{\frac{9}{2} - \frac{15}{4}} = \frac{2400}{1000} \times \frac{9}{2} = 10.8$ km

158.

NO QUESTION

159.

Thief $= x$

$(60-x)15 = (45-x)30$

$x = 30$

Dis $= (60-30)\frac{15}{60}$

$= 7.5$

$\frac{7.5}{10} \times 60 = y - 30$

$y = 75.$

160.

$\frac{100}{2 \times \frac{5}{18}} = 180$ Sec

$8 \times \frac{5}{18} \times 180 = 400$m

161.

$\frac{P+T}{36} = \frac{T}{12}$

$\frac{108+T}{36} = \frac{T}{12}$

$T = 54$

Speed $= \frac{54}{12} \times \frac{18}{5}$

$= 16.2$ km/h

162.

30 min — 500 m

12 " — $\frac{500}{30} \times 12$

$= 200$m

Dis after 12 min

$500 - 200 = 300$ m

163.

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$128+64+32+16+8 = 248$

$\frac{248}{5} = 49.6$

164.

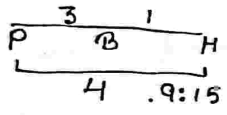
Time V = 8
" K = 7
Let Distance = 56km
V's Speed = 7
K's " = 8

Dis in 2h = 2×7 = 14km
Remin = 56-14 = 42

$\frac{42}{7+8}$ = 2h 48 min

12 : 48

165.



$16 \times \frac{15}{60} \times \frac{3}{4} = 3km$

166.

$\frac{280 \times 18}{(12-7) \times 5 \times 60}$

$\frac{84}{85} = 3\frac{9}{85}$ min

167.

$\frac{110+40}{5} = 50 m/s$

$50 \times \frac{18}{5} = 180$

Q = 180 - 70 = 110

168.

$D \propto t$
$D = kt$
$72 = k \times 2$
$k = 36$
eq $D = 36t$

169.

Time = $\frac{200}{(20-16) \times \frac{5}{18}} = 180$

Dis = $180 \times 16 \times \frac{5}{18} = 800$

170.

Speed 90 : 120
Dis 3 : 4
1 — 1.5
4 — 6km

171.

Total length = 310+330+160
= 800

R. speed = 288

$\frac{800}{288} \times \frac{18}{5} = 10$.

172.

P	T
5K	4K

$\frac{6}{4K} = \frac{1}{2} \Rightarrow K = 3$

$\frac{x}{15-12} = \frac{1}{2}$ $x = 1.5$

173.

$\frac{60}{40} = \frac{3}{2}$ h

$\frac{90}{42} = \frac{2}{1}$ h

Total time = $\frac{7}{2}$

A. Sp = $\frac{150\sqrt{2}}{7}$
= $42\frac{6}{7}$

174.

189 - 135 = 54
So, $\frac{54}{12}$ Speed

$\frac{900}{54} \times 12 = 200$ Sec
= 3 min 20 Sec

175.

Dis in 9 min = $1 \times \frac{5}{18} \times 9 \times 60$ m
= 150m
Rem = 200 - 150 = 50m

176.

$\frac{20}{A-B} = 1$ $A - B = 20$

$\frac{20}{A+B} = \frac{1}{5}$ $A + B = 100$

$2A = 120$
$A = 60$
$B = 40$

177.

P — R — x — Q

$\frac{72+x}{72-x} = \frac{10}{8}$
$x = 8$
PR = 64

178. THE END.

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Boat & Stream

SSC SELECTION PHASE IX

Q1. The speed of a boat in still water is 25 km/h. It takes $33\frac{1}{3}\%$ more time to cover a certain distance in still water than to cover the same distance downstream. How much time (in hours) will the boat take to go 75 km downstream?
(a) 3 (b) 2.25 (c) 2 (d) 1.8

SSC CGL PRE 21

Q2. Anup can row 33 km downstream and 35 km upstream in 8 hours. He can also row 44 km downstream and 28 km upstream in the same time. How much time(in hours) will he take to row 55 km downstream and 14 km upstream?
a) 9 b) 6 c) 7 d) 8

DP 2022

Q3. A boat takes 20 hours to travel downstream from point P to point Q and to come back to a point R which is at midway between P and Q. if the velocity of the stream is 6 km/h and the speed of the boat in still water is 18 km/h, what is the distance between P and Q?
a) 280 km b) 240 km c) 320 km d) 180 km

CPO PRE 22

Q4. A boat can go 40 km downstream and 25 km upstream in 7 hours 30 minutes. It can go 48 km downstream and 36 km upstream in 10 hours. What is the speed (in km/h) of the boat in still water?
a) 6 b) 12 c) 9 d) 15

CGL PRE 22

Q5. A man rows a boat a certain distance downstream in 9 hours, while it takes 18 hours to row the same distance upstream. How many hours will it take him to row three-fifth of the same distance in still water?
a) 9.5 b) 7.2 c) 10 d) 12

Q6. A swimmer swims from a point P against the current for 6 min and then swims back along the current for next 6 min and reaches at a point Q. If the distance between P and Q is 120 m then the speed of the current (in km/h) is:
a) 0.4 b) 0.2
c) 1 d) 0.6

CHSL PRE 22

Q7. The ratio of the speed of the boat in still water to the speed of the stream is 8 : 3 and the boat can travel 22 km downstream in 24 minutes. Then, how much time will the boat take to cover 50 km upstream ?
a) 3 hrs b) 4 hrs c) 2.5 hrs d) 2 hrs

Q8. Ankit went to Manali, for river rafting. He rows at the rate of 12 km/h in still water. To cover the same distance, it takes him twice as long to row up as to row down the river. Find the rate of flow of the river.
a) 8 km/h b) 4 km/h c) 6 km/h d) 2 km/h

CGL PRE 23

Q9. A man takes 15 minutes to row a boat 16 km downstream, which is 25% less than the time taken to row the same distance upstream. How many kilometers can a person row a boat in one hour in still water? (rounded off to the nearest whole number)
1. 58 2. 54 3. 60 4. 56

CPO 2024

Q10. A man wishes to cover 1 km distance in river water. In still water he takes 12 minutes to cover it, but in the flowing river he takes 13 minutes. The speed of the flowing water of the river is:
a) 25 km/h b) 5/13 km/h c) 22 km/h d) 7/12 km/h

CHSL 2024

Q11. A boat can travel 60km downstream in 4 hours. If the speed of the boat in still water is 13 km/h, then in what time will it cover 30 km upstream?
a) $2\frac{8}{11}$ hours b) $3\frac{4}{7}$ hours c) $2\frac{4}{7}$ hours d) $3\frac{5}{7}$ hours

CGL 2024

Q12. A motorboat travelling at some speed can cover 24 km upstream and 40 km downstream in 17 hours. At the same speed it can travel 32 km downstream and 12 km upstream in 10 hours. The speed of the stream is:
a) 5 km/h b) 4 km/h c) 2 km/h d) 3 km/h

Answers

1	B	2	C	3	B
4	C	5	B	6	D
7	D	8	B	9	D
10	B	11	A	12	D

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1.

Time Qs: boat

$\frac{x+y}{y} = \frac{3}{4}$

Speed = 4:3 [Qs: boat]

boat speed in Qs

$= 25 \times \frac{4}{3}$

Time $= \frac{75}{25 \times \frac{4}{3}} = \frac{9}{4}$

$= 2.25\,h$

2.

$\frac{33}{x+y} + \frac{35}{x-y} = 8$

$\frac{44}{x+y} + \frac{28}{x-y} = 8$

$\frac{55}{x+y} + \frac{14}{x-y} = t$

To Solve quickly.

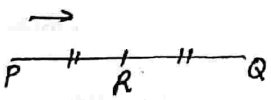
Guess $x+y = 11$

$x-y = 7$

$x =$

$\frac{55}{11} + \frac{14}{7} = 7$

3.



$y = 6\,km/h$

$x = 18\,km/h$

Distance = 2D [Let]

$\frac{2D}{18+6} + \frac{D}{18-6} = 20$

$\frac{D}{12} + \frac{D}{12} = 20$

$\frac{D \times 2}{12} = 20$

$2D = 240$

4.

$\frac{40}{x+y} + \frac{25}{x-y} = \frac{15}{2}\,h \quad -\times 6$

$\frac{48}{x+y} + \frac{36}{x-y} = 10 \quad -\times 5$

$\frac{30}{x-y} = 5$

$x-y = 6$

$x+y = 12$

$2x = 18$

$x = 9$

5.

$\frac{D}{x+y} = 9 \quad , \quad \frac{D}{x-y} = 18$

$9x+9y = 18x-18y$

$9x = 27y$

$\frac{x}{y} = \frac{3}{1}$

$D = 9 \times 4 = 36$

Time $= \frac{36}{3} \times \frac{3}{5} = 7.2\,h$

6.

$-(x-y)6 + (x+y)6 = 120$

$(x+y)360 - (x-y)360 = 120$

$720y = 120$

$y = \frac{1}{6}$

$\frac{1}{6} \times \frac{18}{5} = 0.6\,km/h$

7.

Downstream $= (8+3)R$

$\Rightarrow 11R$

$\frac{22\,km}{11R} = \frac{24}{60}$

$R = 5$

Spd of Boat $= 8 \times 5$

$\Rightarrow 40\,km/h$

" " Stream

$\Rightarrow 3 \times 5$

$\Rightarrow 15\,km/h$

Time (upstream) $= \frac{50}{25} = 2\,hr$

8.

$\frac{D}{12-x} = 2\left(\frac{D}{12+x}\right)$

$12+x = 24-2x$

$3x = 12$

$x = 4\,km/h$ (Ans)

9.

$\frac{16}{x+y} = \frac{15}{60}$, $\frac{16}{x-y} = \frac{20}{60}$

$x-y = 48 \quad x = 56$

$x+y = 64$

10.

$x = \frac{1 \times 60}{12} = 5\,km/h$

$\frac{1}{(5-y)} = \frac{13}{60}$

$y = \frac{5}{13}$

11.

$x+y = \frac{60}{4} = 15$

$x = 13$

$y = 2$

$\frac{30}{13-2} = 2\frac{8}{11}\,h$

12.

$\frac{24}{U} + \frac{40}{D} = 17 \quad -(i)$

$\frac{12}{U} + \frac{32}{D} = 10 \quad -(ii) \times 2$

$\frac{24}{D} = 3$

$D = 8$

$U = 2$

$\frac{8-2}{2} = 3.$

13. THE END.

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RACE

DP 2022

Q1. A covers 1 km in 12 minutes while B covers the same distance in 15 minutes. By what distance does A beat B?
a) 220 meters b) 200 meters
c) 300 meters d) 250 meters

Q2. In a race, a cyclist covers a distance of 500 m in 625 sec in the first lap. He covers the second lap of the same length in 375 sec. what is the average speed (in m/sec) of the cyclist?
a) 5 b) 10 c) 3 d) 1

CPO PRE 22

Q3. Geeta runs 5/2 times as fast as Babita. In a race, if Geeta gives a lead of 40 m to Babita, find the distance from the starting point where both of them will meet (correct up to two decimal places)
a) 66.67 m b) 65 m
c) 65.33 m d) 66 m

Q4. A can run 250m in 25 sec and B in 30 sec. How many metres start can A give to B in a km race so that the race may end in a dead-heat?
a) 169.53 m b) 173.82 m
c) 166.67 m d) 186.34 m

CGL PRE 22

Q5. In a 1500 m race, Anil beats Bakul by 150 m and in the same race Bakul beats Charles by 75 m. By what distance does Anil beat Charles?
a) 217.50 m b) 200.15 m
c) 293.50 m d) 313.7 m

Q6. In a 400-metre race, A runs at a speed of 16 m/s. If A gives B a start of 15 metres and still beats him by 10 sec, then what is the speed of B?
a) 11 m/s b) 10 m/s
c) 13 m/s d) 9 m/sec

Q7. In a 100 m race, A beats B by 20 m and B beats C by 20 m. By how much distance does A beat C.
a) 64 m b) 24 m c) 25 m d) 36 m

Q8. In a 1200 m race, bike A beats bike B by 100 m. Bike B beats bike C by 100 m in a 600 m race. If bike A beats bike C by 30 sec in a 720 m race, then what is the speed of bike C?
a) $\frac{17}{3}$ m/sec b) $\frac{26}{9}$ m/sec
c) $\frac{17}{9}$ m/sec d) $\frac{26}{3}$ m/sec

Q9. In a 1000 m linear race, A beats B by 50 m or 5 sec. What is the difference between the speed (in m/s) of A and B?
a) 9/10 b) 10/19
c) $1\frac{10}{19}$ d) 9/19

Q10. In a race of 1500 m, if vehicle P leads vehicle Q by 200 m, then vehicle P wins the race by 8 sec. Conversely, if vehicle P gives a lead of 400 m to vehicle Q, the race ends in a draw. What is the time taken by vehicle P to cover 1500 m?
a) 40 sec b) 44 sec c) 60 sec d) 45 sec

Q11. In a linear race of 500 m, A can beat B by 50 m and in a race of 600 m, B can beat c by 60 m. By how many meters will A beat C in a race of 400 m?
a) 70 b) 68 c) 76 d) 72

ICAR & Selection Phase XI

Q12. In a circular race along a track of length 3600 m, X and Y run at speeds of 27 km/h and 45 km/h, respectively. Suppose they start at the same time and in the same direction, when will they meet again at the starting point?
1. 1440 sec 2. 1200 sec
3. 2200 sec 4. 720 sec

Q13. In an 800 m race, the ratio of the speeds of two contestants Alka and Mira is 4 : 7. If Alka has a start of 520 m, then Alka will win by:
1. 310 m 2. 280 m
3. 490 m 4. 210 m

Q14. A runs 4/3 times as fast as B. In a race, if A gives a lead of 80 m to B, find the distance from the starting point where they both will meet.
1. 320 m 2. 360 m
3. 300 m 4. 340 m

CGL PRE 23

Q15. Two friends P and Q simultaneously start running from same point around a circular track. They run in the same direction. P runs at 6 m/sec and Q runs at b m/sec. if they cross each other at exactly two points on the circular track and b is a natural number less than 6, then how many values can b take?
1. 2 2. 1 3. 4 4. 3

Q16. On a circular path of 693 m, Sujata and Anjali start from the same point but in opposite directions with speeds of 2.85 km/h and 1.5 m/sec respectively. When will they meet for the first time?
1. After 6.05 minutes
2. After 4.56 minutes
3. After 6.75 minutes
4. After 5.04 minutes

Q17. In a 1170 m race, Raman reaches the final point in 65 seconds and Mohan reaches the final point in 90 seconds. By how much distance does Raman beat Mohan?
1. 325 m 2. 300 m 3. 375 m 4. 350 m

Q18. In a circular race of 4225 m, X and Y start from the same point and at the same time at speeds of 54 km/h and 63 km/h. When will they meet again for the first time on the track when they are running in the opposite direction?
1. 140 s 2. 130 s 3. 150 s 4. 120 s

Q19. In a 200 m linear race, if A gives B a start of 25 m, then A wins the race by 10 seconds. Alternatively, if A gives B a start of 45 m, the race ends in a dead heat. How long does A take to run 200 m?
1. 78 s 2. 77 s 3. 77.5 s 4. 78.5 s

Q20. In 1 km linear race, P beats Q by 120 metres or 30 sec. What is the time taken by P to cover the race?
1. 220 sec 2. 250 sec
3. 235 sec 4. 240 sec

Q21. A circular running path is 1452 m in circumference. Two men start from the same point and walk in opposite direction at the speed of 7.5 km/h and 9 km/h, respectively. When will they meet for the first time?
1. 5.17 min 2. 5.28 min
3. 5.71 min 4. 5.82 min

Q22. Ram and Shyam are racing along a circular track. The speed of Ram is thrice the speed of Shyam. The length of the circular track is 1440 m. After the start of the race from the same point simultaneously, Ram meets Shyam for

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the first time at the end of the 8th minute. If Ram and Shyam start the race again from the same starting point simultaneously, then the time taken by Shyam to finish the race is: (given that the length of the race is same as the length of the track)

1. 7.5 min 2. 16 min
3. 30 min 4. 22.5 min

Q23. Sohan and Amit started a car race from the same point in the same direction and at the same time on a circular track of length 1125 m with speeds of 36 km/h and 54 km/h, respectively. After how much time (in seconds) will they meet for the first time since the start of the race?

1. 220 2. 215 3. 210 4. 225

CHSL PRE 23

Q24. Savitha and Kavitha decided to run a 2250 m long race on a track as long as the length of the race. But Savitha gave Parnika a 396 m head start and also allwed her to start 9 seconds before Savitha started running. Parnika ran at 6 m per second and Savitha caught up with Parnika 250 seconds after Savitha started running. What was Savitha's Speed (in m/s) during the race ?

1. 8 2. 7.2 3. 7.8 4. 7.5

Q25. In a 120 metre race, P beats S by 6 metres. If S starts with a head start of 7.5 metres and it is a 100 metre race, then who wins the race and how many mteres?(Correct to 2 decimal places)

1. P, 2.63 2. S,3.63
3. P,3.63 4. S,2.63

Q26. Two people A and B started running from the same point on a circular track of length 400 m in opposite directions with initial speeds of 10 m/s and 40 m/s, respectively. Whenever they meet, A's speed doubles and B's speed halves. After what time from the start will they meet for the third time?

1. 30 sec 2. 24 sec 3. 26 sec 4. 28 sec

Q27. In a 140 m race, Pankaj runs at a speed of 5/2 m/s. He gives a start of 20 m to Arun and still defeats him by 4 seconds. The speed of Arun is:

1. 1.5 m/h 2. 1.25 m/h
3. 2 m/s 4. 1.75 m/s

Q28. Zeenut and Nasreen participate in a circular race of 1.2 km. They start the race at a speed of 18 km/h and 27 km/h, respectively, from the same point at the same time. After how much time (in minutes) will they meet at the starting point for the first time, if they are running in the same direction?

1. 8 2. 9 3. 7 4. 10

Q29. In a linear race of 1000 m, Prakash beats Ved by 280 m, while Ved beats Rahul by 100 m. by how many metres does Prakash beat Rahul, in the same race?

1. 346 2. 350 3. 352 4. 348

SELECTION PHASE XII

Q30. In a race of 400 m, Bhim gave Saral a head start by 20 m at the start of the race. Saral took 48 seconds to complete the race. What was the speed (in m/s) of Bhim if Saral defeated Bhim by a margin of 2 seconds?

a) 8 b) 8.7
c) 7.6 d) 7.4

Q31. In a 150-m race, if R gets a 5-metre head start, then he would beat S by 35 metres. If S gets a 25-metre head start in a 100- metre race, then _____ would win the race by _____ metres.

a) R; 5.44 b) S; 5.44
c) S; 4.44 d) R; 4.44

Q32.. In a 3000 m race, if vehicle A gives vehicle B a start of 400 m, then vehicle A wins the race by 10 s. If vehicle A gives vehicle B a start of 750 m, then the race ends in a dead heat. How long does vehicle A take to run 3000 m?

a) 90.5 s b) 100 s
c) 64.3 s d) 92.5 s

Q33. In a 200-m race, if A gives B a head start of 35 m, then A wins the race by 20 sec. Alternatively, if A gives B a head start of 55 m, the race ends in a dead heat. How long does A take to run 200 m?

a) 150 sec b) 165 sec
c) 145 sec d) 155 sec

CHSL 2024

Q34. Arun and Bhaskar run a race of 3 km. First, Arun gives Bhaskar a head start of 400 m and beats him by 30 seconds. While coming back, Arun gives Bhaska a lead of 2.5 minutes and gets beaten by 500 m. What is the difference between the times in minutes in which Arun and Bhaskar can run the race for one side separately?

a) 3 min b) 1.5 min
c) 2.5 min d) 2 min

Q35. In a 100-m race, A beats B by 20 m and B beats C by 5 m. In the same race, find the distance by which A beats C.

a) 22 m b) 24 m
c) 26 m d) 25 m

CGL 2024

Q36. Seema walks around a circular field at the rate of 3 rounds per hour, while Priya runs around it at the rate of 8 rounds per hour. They start in the same direction from the same point at 11 : 54 p.m. They shall first cross each other at:

a) 12 : 06 p.m b) 12 : 00 a.m

c) 12 : 06 a.m d) 11 : 59 p.m

Q37. M and N walk along a circular track. They start at 5 : 00 a.m. from the same point in the opposite directions. M and N walk at a speed of 5 rounds per hour and 2 rounds per hour, respectively. How many times will they cross each other before 6 : 30 a.m. on the same day?

a) 3 b) 7
c) 10 d) 5

Answers

1	B	2	D	3	A
4	C	5	A	6	A
7	D	8	A	9	B
10	B	11	c	12	D
13	A	14	A	15	B
16	D	17	A	18	B
19	C	20	A	21	B
22	B	23	D	24	C
25	D	26	C	27	C
28	A	29	C	30	A
31	B	32	C	33	C
34	B	35	B	36	C
37	C				

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1.

$S \propto \frac{1}{T}$

$\frac{T_A}{T_B} = \frac{12}{15} = \frac{4}{5}$

$\frac{S_A}{S_B} = \frac{5}{4}$

Distance A beat B

$= \frac{1000m \times (5-4)}{5}$

$= 200m$

2.

$\frac{500+500}{625+375} = \frac{1000}{1000}$

$= 1$

3.

$\frac{S_A}{S_B} = \frac{5}{2}$

$S \propto$ Distance

$\frac{D_A}{D_B} = \frac{5}{2}$)3

$\frac{40}{3} \times 5 = 66.67m$

4.

$T \propto \frac{1}{S}$

$\frac{T_A}{T_B} = \frac{25}{30} = \frac{5}{6}$

$\frac{S_A}{S_B} = \frac{6}{5}$

$= \frac{200}{6} \times 5 = 166.67m$

5.

A : B C

1500 1350 B:C = 1500:1425

10 : 9 60 : 57

A:B:C = 200:180:171 — Distance

$\frac{1500}{200} \times (200-171)$

$= \frac{435}{2} = 217.50m$

6.

Distance for B = 400 - 15 = 385

Time " A = $\frac{400}{16} = 25$

Time " B = 25 + 10 = 35

Speed of B = $\frac{385}{35} = 11 m/s$

7.

A:B = 100 : 80

B:C = 100 : 80

A:B:C = 25 : 20 : 16

$\times 4$ $\times 4$

100 64

36m

8.

A:B = 1200 : 1100

B:C = 600 : 500

A:B:C = 72 : 66 : 55

720 550

170

Speed of C = $\frac{170}{30}$

$= \frac{17}{3} m/s$

9.

A : B = 1000 : 950

Speed of A = $\frac{50}{5} = 10 m/s$

Time of A = $\frac{1000}{10} = 100 Sec$

Time of B = 95 Sec

Speed of B = $\frac{1000}{95}$

B - A = $\frac{1000}{95} - 10$

$= \frac{50}{95} = \frac{10}{19}$

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10.

$D \propto S$

$\frac{S_P}{S_Q} = \frac{1500}{1100} = \frac{15}{11}$

$\frac{1300}{11x} - \frac{1500}{15x} = 8$

$x = \frac{200}{8 \times 11}$

$15x = \frac{15 \times 200}{8 \times 11}$

Time = $\frac{1500}{15x}$

$= \frac{1500 \times 8 \times 11}{15 \times 200}$

$= 44 Sec$

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11.

A:B = 500 : 450

B:C = 600 : 540

A:B:C = 100 : 90 : 81

400 324

76m

12.

$\frac{3600 \times 18}{(45-27) \times 5}$

$\frac{3600 \times 18}{18 \times 5} = 720 Sec$

13.

A : m

S/D 4 : 7

800 - 520 = 280

$\frac{280}{4} \times 7$

$= 490$

A is a = 800 - 490

$= 310$

14.

Speed A:B = 4:3

Distance = 4:3

$\therefore$ S $\propto$ D $\frac{80}{1} \times 4$

$= 320$

15.

P = 6 m/s

Q = 6 m/s

Distance = x

they 1st time meet = $\frac{x}{6-6}$

they meet at starting point = $\frac{x}{6}$

no of time they meet

$\frac{x}{6} \times \frac{6-6}{x} = 2$

b = (1, 2, 3 .....)

$\therefore$ b = 2 (Satisfy)

Only 1 Value.

16.

$\frac{695}{15 + 2.85 \times 5} = \frac{2.85 \times 5}{18}$

$= \frac{695 \times 18}{4125}$

$= 302.4$

$= 5.04$ min

17.

t = 65 : 90

13 : 18

S/D = 18 : 13

$\frac{1170}{18} \times 5$

$= 325m$

18.

$\frac{4225 \times 18}{(54+63) \times 5}$

$\frac{4225 \times 18}{117 \times 5}$

$= 130 Sec$

19.

45 - 25 = 20m

↓

Travelled in 10sec

Speed of B = 20÷10 = 2 m/s

Time of A in 200m

= time of B in 155m

$= \frac{155}{2} = 77.5 Sec.$

20.

$S_P = \frac{120}{30} = 4 m/s$

Dis of P = 880

$T = \frac{880}{4} = 220 Sec$

21.

$\frac{1452 \times 18}{(7.5+9) \times 5}$

$\frac{1452 \times 18}{16.5 \times 5}$

$= 5.28$ min

22.

R : S = 3 : 1

$\frac{1440}{3x - x} = 8$

$x = 90$ m/min

Time of S = $\frac{1440}{90}$

$= 16$ min

23.

$\frac{1125 \times 18}{(54-36) \times 5}$

$\frac{1125 \times 18}{18 \times 5}$

$= 225$

24.

P's time = 250+9
= 259 Sec

Total Dis = 396+259×6
= 1950

S's time = 250 Sec

Total Dis = 1950

Speed = $\frac{1950}{250}$
= 7.8 m/s

25.

Speed P:S = 120 : 114
60 : 57

Dis P:S = 100 : 92.5

Time P:S = $\frac{5}{3}$: $\frac{92.5}{57}$

5×57 > 275.5

S wins

S's Dis = $\frac{92.5}{57}$×60
= 97.36

Won by = 100 − 97.36
= 2.63

26.

A — 10 m/s
B — 40 m/s

1st $\frac{400}{40+10}$ = 8 Sec

2nd $\frac{400}{20+20}$ = 10 Sec

3rd $\frac{400}{10+40}$ = 8 Sec

Total time = 8+10+8
= 26 Sec

27.

P's time = $\frac{140}{5}$×2 = 56 sec

A's time = 56+4 = 60 sec

A's Dis = 120 m

Speed = $\frac{120}{60}$ = 2 m/s

28.

$\frac{1.2}{9}$×60 = 8 min

29.

P : V : R

1000 : 720 : 72

10 : 1000 : 900

1000 : 720 : 648

352 m

30.

400

20

S's time = 48

B's " = 48+2
= 50

B = $\frac{400}{50}$ = 8 m/s

31.

R's Dis = 150−5 = 145

S's " = 150−35 = 115

Speed ∝ Dis

Speed R:S = 145 : 115
29 : 23

S's time in 75 m

$\frac{75}{23}$ = 3.26

R's Dis 3.26 min

3.26×29 = 94.54

100 − 94.54 = 5.46

≈ S ; 5.44

32.

$\frac{2600}{B} - \frac{3000}{A} = 10$

$\frac{2250}{B} = \frac{3000}{A}$

$\frac{A}{B} = \frac{4}{3}$

$\frac{2600}{3x} - \frac{3000}{4x} = 10$

$x = \frac{35}{3}$

33.

$\frac{165}{B} - \frac{200}{A} = 20$

$\frac{145}{B} = \frac{200}{A}$

$\frac{A}{B} = \frac{40}{29}$

$\frac{165}{29x} - \frac{200}{40x} = 20$

$x = \frac{1}{29}$

$\frac{200}{A}$ = 145 sec.

34.

3000 2600 30 sec — (i)

2500 3000 150 sec — (ii)

500 −400 −120 × 6

3000 −2400 − 720 — (iii)

(i) − (iii)

B = 5000 in 750 sec

B — 3000 " 450 "

B — 2600 " 390 "

Diff 450 − 360 = 1.5 min

35.

A	B	C
100	80	
	100	95

100 : 80 : 76

24.

36.

Sima's time 1 round = 20

Speed = $\frac{d}{20}$

Priya's speed = $\frac{2d}{15}$

meeting $\frac{d}{\frac{2d}{15} - \frac{d}{20}} = \frac{300}{25}$

11:54 + 12 = 12:06

37.

5 to 6:30 = 1.5 h

60 min — 5+2 = 7 Ro

30 min — 3.5 Roun

Total = 7+3 = 10

38.

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AVERAGE

Q1. The average weight of a certain number of students in a class is 68.5 kg. If 4 new students having weights 72.2 kg, 70.8kg, 70.3kg and 66.7 kg join the class, then the average weight of all the students increases by 300 g. The number of students in the class initially is:
(a) 21 (b) 16 (c)11 (d) 26

SSC CGL 4 June 2019

Q2. The average of a number and its reciprocal is 4. The average of its cube and reciprocal is equal to:
(a)256 (b)142 (c)288 (d)244

SSC CHSL 9 July 2019

Q3. The difference between the average of first ten prime numbers and the first ten prime numbers of two digits is:
(a) 14.5 (b) 16.5 (c) 12.5 (d) 13.5

SSC CHSL - 10 July 2019

04. The average of the squares of numbers 1 to 5 is:
(a)11 (b)5 (c)8 (d)9

SSC CPO 16 March 2019

05. The average of all the prime and composite numbers up to 100 is:
(a)51 (b)50 (c)50.5 (d) 49.5

SSC MTS 9 August 2019

Q6. The average weight of a certain number of students in a group is 72 kg. If 10 students having an average weight of 78 kg leave and 4 students having an average weight of 80 kg join the group. the average weight of the students in the group decreases by 0.7 kg. The number of students initially in the group is :
(a) 56 (b) 46 (c)44 (d) 54

SSC CGL Tier 2 12 September 2019

Q7. The average age of 120 students in a group is 13.56 years, 35% of the number of students are girls and the rest are boys. If the ratio of the average age of boys and girls is 6:5, then what is the average age (in years) of the girls?
(a)12 (b) 11.6 (c) 10 (d) 141

SSC CGL Tier 2 13 September 2010

Q8. Three numbers are such that if the average of any two of them is added to third number, the sums obtained are 164, 158 and 132 respectively. What is the average of the original three numbers?
(a) $75\frac{2}{3}$ (b)74 (c)76 (d) $75\frac{1}{3}$

SSC CGL 7 June 2019

MTS 2019

Q9. The average of six observations is 15. The average of first three among them is twice the average of the last three. What is the sum of the last three observations?
(a)35 (b) 200 (c)25 (d) 30

Q10. In a class, the number of girls is 60% more than that of boys. The average weight of the boys is 2.6 kg more than that of girls. If the average weight of all the boys and girls is 50 kg, then find the average weight (in Kg.) of girls.
(a) 48.8 (b) 49.2 (c)49 (d) 48

Q11. The average of 12 numbers is 18.5. The average of the first six numbers is 16.8 and that of the last seven numbers is 17.4. If the 6th number is excluded, then what is the average (correct to one decimal place) of remaining 11 numbers?
(a) 17.9 (b) 18.9 (c) 18.4 (d) 20.1

Q12. Age of A is 6 years more than three times the age of B. After three years, A's age will be 8 years more than twice the age of B. The average of present age of A and B (in years) is:
(a) 12 (b) 11 (c) 14 (d) 13

Q13. The average of n observations is 40, If one observation of value 80 is added, then the average of all the observations is 41. What is the value of n?
(a) 40 (b) 39 (c) 38 (d) 43

SSC CPO 2019 11 December 2019

Q14. The average age of 24 students is 15.5 years. The age of the teacher is 24 years more than the average age of all students and the teacher. What is the age (in years) of the teacher?
(a) 40 (b) 42 (c) 41.4 (d) 40.5

SSC CPO 13 December 2019

CGL PRE 2019

Q15. The average age of a number of persons in a group was calculated as 35 years, which was 2.5 years more than the correct average as there was an error in recording the age of two persons as 38.5 years and 40 years instead of 29 years and 22 years respectively. The number of persons in the group was:
(a) 11 (b) 12 (c) 15 (d) 13

Q16. The average marks of 30 boys is 88, and when the top two scores were excluded, the average marks reduced to 87.5. If the top two scores differ by 2, then the highest marks is:
(a) 94 (b) 96 (c) 90 (d) 92

CHSL 2019

Q17. The average of 35 consecutive natural numbers is N. Dropping the first 10 numbers and including the next 10

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numbers, the average is changed to M. If the value of $M^2 - N^2 = 600$, average of 3M and 5N is:
(a)90 (b)120 (c)100 (d)115

Q18. The numbers 24, 45, a, 35, 59, 83 46, b, 29, 74 are serially numbered they appear in the sequence. When each number is added to its serial number then the average of the new numbers formed is 55. The average of the missing numbers (a and b) is:
(a) 38 (b) 58 (c) 62 (d) 50

Q19. The average of nine 2 digit numbers is decreased by 6 when the digits of one of the 2 digit numbers is interchanged. Find the difference between the digits of that number.
(a)6 (b)4 (c)2 (d)8

Q.20. If 40 is added to a list of natural numbers, the average is increased by 4. When 30 is added to the new list, the average of the numbers in the new list is increased by 1. How many numbers were in the original list?
(a)4 (b) 5 (c)8 (d) 6

Q.21. The average of P, Q and R is 62 /kg. The weight of R is 12 kg more than P and 9 kg more than Q. What is the average weight of P, Q, R and S if the weight of S is 15 kg less than R?
(a)58 kg (b) 62 kg (c) 64kg (d) 60 kg

Q22. Several students have taken an exam. There was an error in the answer key which affected the marks of 48 students, and their average marks reduced from 78 to 66. The average of remaining students increased by 3.5 marks. This resulted the reduction of the average of all students by 4.5 marks. The number of students that attended the exam is:
(a) 96 (b) 84 (c) 93 (d) 100

CGL PRE 2020

Q.23 The average height of some students in a group is 156 cm. If 5 students of average height 160 cm join the group, then the average height of all the students in the group increases by 0.8 cm. What is the number of students in the group, initially?
(a)25 (b)10 (c)15 (d)20

Q.24 The average of 8 consecutive even numbers written in ascending order is 17. What is the average of the last three numbers, 36 and 53?
(a)29.8 (b)31.6 (c)32.2 (d)31

Q.25 The average of ten numbers is 32.5. The average of first four numbers is 25.6 and that of the last three numbers is 38.2. The 5th number is 50% more than the 6th number and 8 less than the 7th number. What is the average of 5th and 7th numbers?
(a)42.4 (b)42 (c)41 (d)41.5

Q.26 The average daily production of toys in a factory in the month of December is 512. If the average production during first 20 days is 515 and that of the last 13 days is 510, then what is the average of production on 19 and 20 December?
(a)529 (b)513 (c)1058 (d)512

Q.27 The average of squares of five consecutive odd natural numbers is 233. What is the average of the largest number and the smallest number?
(a)17 (b)13 (c)11 (d)15

Q.28 The average monthly salary of 60 employees of a factory is Rs29900. If two officers are getting Rs90000 each and the average salary of 8 supervisors is Rs65000, then what is the average (in salary) of the remaining employees?
(a)22680 (b)29080 (c)21080 (d)21880

Q.29 In an examination, the average score of a student was 67.6. If he would have got 27 more marks in Mathematics, 10 more marks in Computer Science, 18 more marks in History and retained the same marks in other subjects, then his average score would have been 72.6. How many papers were there in the examination?
(a)10 (b)12 (c)11 (d)9

Q.30 The average weight of students of section A and B having 40 students each is 45.5 kg and 44.2 kg respectively. Two students of section A having average weight 48.75 kg were shifted to section B and 2 students of section B were shifted to section A, making the average weight of both the sections equal. What is the average weight (in kg) of the students who were shifted from section B to section A?
(a)35 (b)35.75 (c)34.5 (d)34.25

Q.31 There are some children in a camp and their average weight is 40 kg. If 5 children with average weight 36 kg join the camp or if 5 children with average weight 43.2 kg leave the camp, the average weight of children in both cases is equal. How many children are there in the camp, initially?
(a)45 (b)40 (c)35 (d)50

Q.32 What is the product of the average of first ten positive odd numbers and the average of first fifteen positive even numbers?
(a)44 (b)160 (c)85.25 (d)150

Q.33 What is the average of numbers from 1 to 50 which are multiples of 2 or 5? (correct to one decimal place)
(a)25.9 (b)26.4 (c)25.4 (d)25.8

CHSL 2021

Q.34 The average height of a certain number of students in a group is 155.6 cm. If 12 students having an average height of 150.5 cm join the group and 7 students having an average height of 159 cm leave the group, the average height of the students in the group will decrease by 34 mm. What is the number of students, initially, in the group?
(a) 25 (b)40 (c)30 (d)20

Q.35 The average of eighteen numbers is 42. The average of the last ten numbers is 40 and that of the first five numbers is 44. The seventh member is 6 less than the sixth and 7 less than the eighth number. The average of the sixth and the eighth number is:
(a)47.5 (b)45 (c)46.5 (d)48

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Q.36 The average of the squares of four consecutive odd natural numbers is 201. The average of 7 times of the largest number and 3 times of the smallest number is:
(a)78 (b)76 (c)72 (d)66

Q.37 There are 3 groups of persons -male, female and children. There are 20 males and the number of females and children taken together is 4 more than that of the males. The average weight of males is 54 kg, that of females is 49 kg and that of children is 30 kg. If the average weight of the whole group is 48.25 kg, then what is the difference between the number of females and the number of children?
(a)17 (b)10 (c)13 (d)14

Q.38 x, y and z are three positive numbers such that y is 4/5 times of x and z is 5/8 times of y. If the average of reciprocals of the numbers x, y and z is 17/240, then the average of 3 times of x and 5 times of y will be:
(a) 60 (b)40 (c)70 (d)45

Q.39 A batsman in his 13th inning makes a score of 97 runs, thereby increasing his average score by 5. What is his average score after the 13th inning?
(a)77 (b)67 (c)37 (d)57

Q.40 The average weight of 30 persons of group A is 3 kg more than the average weight of 25 persons of group B. The average weight of 25 persons of group B is 2.5 kg more than the average weight of 20 persons of group C. If the total weight of 30 persons of group A is 1725 kg, then what will be the average weight of the persons of group A and group C taken together (in kg)?
(a)55.4 (b)55.1 (c)55.3 (d)55

Q.41 30 people went to a restaurant for a dinner party, 20 of them paid 880 each and each of the rest of them paid 110 more than the average of the total expenses. What was the total expense for the dinner?
(a)29,360 (b)24,580 (c)27,840 (d)28,050

Q.42 The average of 40 numbers is 48.2. The average of the first 15 numbers is 45 and that of the next 22 numbers is 50.5. The 38th number is 1 more than the 39th number, and the 39th number is 3 less than the 40th number. What is the average of the 39th and 40th numbers?
(a)49 (b)47.5 (c)48 (d)48.5

Q.43 The average age of 7 members of a family is 35 years. If the youngest members are twins and they are 15 years old, then what was the average age (in years) of the family members at the time of the birth of the twins?
(a)27 (b)30 (c)28 (d)25

Q.44 The average number of electronic items sold by a trader in 2004, 2005, 2006 and 2007 is 18950 and that sold in 2005, 2006, 2007 and 2008 is 21725. If the number of items sold in 2008 is 12750, then the number of items sold in 2004 is:
(a)1700 (b)1650 (c)1600 (d)1550

Q.45 The average of the numbers a, b, c and d is 2d - 4. Also, the averages of the numbers a and b; b and c; c and d are 8, 5 and 4, respectively. If e = a + d+ 1, then what is the average of the numbers d and e?
(a)8.5 (b)3 (c)10 (d)7

Q.46 The average weight of some students in a group is 58 kg. If 8 students of average weight 54 kg leave the group, and 3 students weighing 53.6 kg, 54 kg and 57.4 kg join the group, then the average weight of the remaining students in the group will increase by 575 g. The number of students, initially, in the group is:
(a)45 (b)35 (c)40 (d)50

SSC SELECTION PHASE IX

Q47. The ratio of the number of boys to the number of girls in a class is 4 : 15. The average height of the boys is 161.2 cm and the average height of all the students is 154.5 cm. what is the average height (in cm) of the girls?(correct to one decimal place)
(a) 156.8 (b) 147.5 (c) 152.7 (d) 158.2

Q48. The average runs scored by Sumit in the first 3 matches is 122, In the 4th match, he scored some runs such that his average runs now become 130, in the 5th match, he scored 14 less runs than those in the 4th match, and now the average of his last 4 matches becomes 164. The runs scored by Sumit in the 1st match is:
(a) 9 (b) 3 (c) 5 (d) 4

Q49. A library has an average of 538 visitors on Sundays and 237 on other days. The average number of visitors (approximate to the nearest integer) per day in a month of 31 days beginning with a Monday is:
(a) 280 (b) 254 (c) 252 (d) 276

SSC CGL PRE 21

Q50. The average of 46 numbers is 50.5. the average of the first 25 numbers is 45 and that of the last 18 number is 56. The 28th number is 67. If the 26th and 27th numbers are excluded, then what is the average of the remaining numbers?
a) 51.5 b) 50.4 c) 50 d) 51

Q51. The average of twelve numbers is 42. The average of the last five numbers is 40, and that of the first four numbers is 44. The sixth number is 6 less than the fifth number and 5 less than the seventh number. The average of the sixth and seventh number is:
a) 44.5 b) 45.5 c) 43.5 d) 41.5

Q52. The average of eleven consecutive positive integers is d. if the last two numbers are excluded, by how much will the average increase or decrease?
a) Will increase by 1 b) Will decrease by 2
c) Will increase by 2 d) Will decrease by 1

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Q53. A college hostel mess has provisions for 25 days for 350 boys. At the end of 10 days, when some boys were shifted to another hostel, it was found that now the provisions will last for 21 more days. How many boys were shifted to another hostel?
a) 110 b) 98 c) 92 d) 100

SSC MTS 2020

Q54. A retailer opens her outlet on all seven days of the week. It is observed that her average sales for Saturday and Sundays combined is Rs 300, and Rs 200 for the remaining five days combined. For a month starting on a Saturday, it was found that the total sales were Rs 7,000. Which among the following months it could be?
(a) January (b) March (c) April (d) February

Q55. While listing N consecutive even numbers for determining their average, the last number, by mistake, got replaced by the next odd number and thereby the average turned out to be more than the desired value by 0.0125. what is the value on N?
(a) 50 (b) 40 (c) 80 (d) 100

Q56. The average monthly expenditure of a family was Rs 10,000 during the first three months, Rs 12,500 during the next four months, and Rs 13,500 during the last five months of a year. If the total savings during the year were Rs 32,500, then the average monthly income (in Rs) of the family was:
(a) 15,000 (b) 17,250 (c) 13,750 (d) 14,250

Q57. The average of 40% of a number and 33% of the same number is 73. The average of $\frac{1}{5}$ th and $\frac{1}{4}$th of that number is:
(a) 40 (b) 42 (c) 45 (d) 50

Q58. Amar drives his car for 2 hours at a speed of 70 km/h, for 3 hours at a speed of 80 km/h and for 1 hour at a speed of 40 km/h and reaches his hometown. What is his average speed (in km/h)?
(a) 66 (b) 70 (c) 60 (d) 64

CGL MAINS 2021

Q59. The average of 25 numbers is 64. The averages of the first 13 numbers and that of the last 13 numbers are 62.8 and 72.2 respectively. If the 12th number is 61, and if the 12th and 13th numbers are excluded, then what is the average of the remaining numbers (correct to one decimal place)?
(a) 59.2 (b) 62.2 (c) 60.2 (d) 61.5

Q60. What is the difference between the average of first 148 even positive numbers and the average of first 129 odd positive numbers?
a) 21 b) 19 c) 20 d) 23

CPO PRE 22

Q61. The average salary of all the employees in a company is Rs14,000. The average salary of 5 technicians is Rs18,000 and the average salary of the rest is Rs13,200. The total number of employees in the company is:
a) 28 b) 30 c) 29 d)27

CGL PRE 22

Q62. If the average of a number is r^4 and the average of r number is s^4, then find the average of all r + s number?
a) $rs(r^2 + s^2 - rs)$ b) rs
c) $r^2 + s^2$ d) $rs(r^2 + s^2)$

Q63. The average weight of 49 students in a class is 39 kg. Seven of them whose average weight is 40 kg leave the class and other seven students whose average is 54 kg join the class. What is the new average weight (in kg) of the class?
a) 41 b) 39 c) 42 d) 40

Q64. The average marks of 60 students in a class are 62. The average marks of boys and girls in that subject are 60 and 65, respectively. The number of boys in the class is:
a) 36 b) 25 c) 41 d) 31

Q65. Ram, Shyam, Rohan, Reeta and Mukesh are five members of a family who are weighed consecutively and their average weight is calculated after each member is weighed. If the average weight increases by 2 kg each time, how much heavier is Mukesh than Ram?
a) 14 kg b) 18 kg c) 16 kg d) 12 kg

CHSL PRE 2022

Q66 The average age of 120 members of a society is 62.5 years, by addition of 30 new members, the average age becomes 58.2 years. What is the average age of newly joined members?
a) 42 years b) 40 years
c) 39 years d) 41 years

Q67 The average age of a class of 6 girls is x years. Four new girls having ages x – 2, x + 4, x + 8 and x + 10 joins the class. What is the new average age of the class?
a) x - 2 b) x + 5 c) x + 1 d) x + 2

Q68 Of the 5 subjects, the average marks of Rakesh in first 3 subjects was 75 and the average marks in the last 3 subjects was 82. If his marks in the third subject was 66, then what was his average marks in all the 5 subjects ?
a) 84 b) 76 c) 80 d) 81

Q69 What will be the average of the first 8 positive even numbers divisible by 9?
a) 45 b) 72 c) 81 d) 63

Q70 The average marks obtained by 80 students in an examination is 50. If the average marks of passed students is 55 and the number of students who failed the examination are 30, then what is the average marks of students who failed the examination ?
a) 41.66 b) 46.66 c) 40.33 d) 52.33

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Q71 The average of marks obtained by X and Y is 35 less than the average marks obtained by Y and Z. if the marks obtained by Z is 85. What is the marks obtained by X?
a) 155 b) 15 c) 35 d) 25

Q72 Average of the height of 286 students of a school is 50 unit. If the average of the height of the boys is 53 unit and the average of the height of the girls is 31 unit, then what will be the ratio of the total height of boys and the total height of girls respectively?
a) 1007 : 93 b) 530 : 31
c) 1004 : 91 d) 1111 : 62

Q73 10 Consecutive numbers are given. If the average of the two numbers given in the middle is 13.5, then what is the sum of the first 6 numbers ?
a) 67 b) 58 c) 69 d) 55

Q74 Average of 6 consecutive even numbers is 35. What will be the sum of smallest and largest even number among these 6 number?
a) 66 b) 70 c) 68 d) 72

Q75 The average age of Ram and Shyam is 28 years, if Rahim replaces Ram then the average age will become 26 years. If Rahim replaces Shyam, then the average age will become 30 years. What are the respective ages of Ram, Shyam and Rahim?
a) 48 years, 40 years and 26 years
b) 34 years, 40 years and 30 years
c) 32 years, 24 years and 28 years
d) 38 years, 44 years and 36 years

ICAR & Selection Phase XI

Q76 A is the average of 10 given numbers. B is the average after 2 of the numbers were replaced by 3 other different numbers. The average of the removed numbers is 48 and the average of the newly included numbers is 56. If A + B = 438, then the value of A – B is:
1. 26 2. 12 3. 21 4. 14

Q77 In an exhibition, in the month of December starting with Thursday, the average number of visitors on Saturday is 254, the average number of visitors on Sundays is 625 and an average number of visitors on other days of the month is x. If the average number of visitors, per day, for the whole month is 238, then what is the value of x ?
1. 163 2. 166 3. 165 4. 164

Q78 Out of 72 students in a class, the number of boys is 40% more than the number of girls. The average score of all the students in a test is 63. If the average score of the girls is 30% more than that of the boys, then what is the average score of the girls?
1. 71.5 2. 74.1 3. 72.8 4. 70.2

Q79 The average age of 17 persons is 37 years. The average age increases by 1 year when 2 new persons are included. What is the average age of the new persons?
1. $36\frac{1}{2}$ 2. $48\frac{1}{2}$ 3. $38\frac{1}{2}$ 4. $46\frac{1}{2}$

CGL PRE 2023

Q80. 20 students of a college went to a hotel. 19 of them spent Rs 175 each on their meal and the 20th student spent Rs 19 more than the average of all the 20. Find the total money spent by them.
1. Rs 3,490 2. Rs 3,540
3. Rs 3,520 4. Rs 3,500

CHSL PRE 23

Q81. During a donation drive week of school, students determined to donate an average sum of Rs 8,000 on each working day of the School, collectively (there was no holiday in the donation week except Sunday). From Monday to Friday, they collected Rs 7230, Rs 6435, Rs 6927, Rs 6855 and 6562, respectively. How much they must collect on Saturday to meet their target?
1. Rs 13,991 2. Rs 6,000 3. Rs 4,991 4. Rs 6,991

Q82. The average weight of a group of 12 children is 66 kg. If 2 children, X and Y, replace A and B, the new average weight becomes 65 kg. The weight of A = weight of B and the weight of X = weight of Y. Another child, C, is included in the group, and the new average weight remains 65 kg. Weight of C = weight of X. Find the weight of A.
1. 69 kg 2. 72 kg 3. 71 kg 4. 67 kg

Q83. Find the average of the prime numbers lying between 51 and 77.
1. 66 2. 64 3. 65 4. 67

Q84. Rajender is working as a delivery boy in a multinational company. The company is paying him Rs90 per delivery. In fortnight comprising 15 consecutive working days, his average earnings per days was Rs 540. If his average earnings of the first 7 days was Rs 519 per day and that of the last 7 days was 546 per day, then what was his earning on the 8th day of the fortnight?
1. Rs 571 2. Rs 681 3. Rs 661 4. Rs 645

Q85. If $A = \frac{1}{7}$ and $B = \frac{1}{8}$ and the average of A, B and C is $\frac{1}{13}$, then the value of C is:
1. $-\frac{49}{728}$ 2. $-\frac{89}{728}$ 3. $-\frac{31}{728}$ 4. $-\frac{27}{728}$

SELECTION PHASE XII

Q86. The average temperature of a city for the first four days of the week is 25°C, and the average temperature for the last four days is 30°C. If the average temperature for the entire week is 27°C, then what is the temperature on the fourth day?
a) 30°c b) 31°c c) 29°c d) 28°c

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Q87. A packet has to consist of three types of jellies – orange, mango and strawberry. The price per unit of orange, mango and strawberry jelly is ₹2.00, ₹3.00 and ₹3.50, respectively. In a packet, there are 80 orange jellies, 50 mango jellies and 120 strawberry jellies. What is the average cost (in ₹) of a jelly in a mixed packet?

a) 2.92 b) 3.02 c) 2.80 d) 2.96

ANSWERS

1	B	2	D	3	D
4	A	5	A	6	B
7	A	8	A	9	D
10	C	11	D	12	D
13	B	14	D	15	A
16	B	17	D	18	D
19	A	20	A	21	D
22	C	23	D	24	D
25	D	26	A	27	D
28	D	29	C	30	B
31	A	32	B	33	D
34	D	35	A	36	B
37	B	38	C	39	C
40	C	41	D	42	B
43	C	44	B	45	C
46	A	47	C	48	D
49	D	50	C	51	D
52	D	53	D	54	C
55	C	56	A	57	C
58	B	59	C	60	C
61	B	62	A	63	A
64	A	65	C	66	D
67	D	68	D	69	C
70	A	71	B	72	A
73	C	74	B	75	C
76	D	77	D	78	C
79	D	80	C	81	A
82	C	83	B	84	D
85	D	86	B	87	A

(54) If a month start with Saturday, that month must have 5 saturdays & 5 Sundays

$340 \times 10 + 240 \times x = 4000$

$x = 20$

Total days = 20+10 = 30 (April)

(50) If 26th & 27th excluded then 46−2 = 44

$\text{Avg} = \frac{25 \times 45 + 18 \times 56 + 67}{44}$

$= 2200/44 = 50$

(33) For 2 :- 2, 4 ... 50

No. of terms = 25

Sum = 650

For 5 :- 5, 10 ... 50

No of terms = 10

Sum = 275

For 2 or 5 ie 10 → 10, 20, 30, 40, 50

No. of term = 5

Sum = 150

$AV = \frac{650+275-150}{25+10-5} = \frac{775}{30} = 25.8$

(43) Total age of 7 member = 7×35

At time of birth of twins, Total age of 5 members = 7×35 − 15×7 = 140

Avg = 140/5 = 28 yrs

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1.

Net deviation → $\frac{3.7+2.3+1.8-1.8}{300} \times 1000 = 20$

Student initially = 20 − 4 = 16 Ans

2.

$x + \frac{1}{x} = 4 \times 2 = 8$

$\frac{x^3 + \frac{1}{x^3}}{2} = \frac{512 - 8 \times 3}{2} = 244$ Ans

3.

First ten Prime Numbers are =

2 + 3 + 5 + 7 + 11 + 13 + 17 + 19 + 23 + 29

First ten Prime Numbers of two digits =

11 + 13 + 17 + 19 + 23 + 29 + 31 + 37 + 41 + 43

Average = $\frac{135}{10}$ = 13.5 Ans

4.

$\frac{n(n+1)(2n+1)}{6} \times \frac{1}{5} = \frac{5 \times 6 \times 11}{6 \times 5} = 11$

5.

0, 9, ... 99, 100

Avg = $\frac{1^{st} \text{ term} + \text{last term}}{2}$

= $\frac{2 + 100}{2}$ = 51

6.

$\frac{-6 \times 10 + 8 \times 4}{0.7} = 40$ (By Deviation)

Number of students initially = 40 + 10 − 4

= 46 Ans

7.

Boys : Girls

6 : 5

65% 35%

13 7

Average = $\frac{6 \times 13 + 5 \times 7}{20}$

= $\frac{113}{20} \rightarrow 13.56$

$1 \rightarrow 2.4$

$5 \times 2.4 = 12$ Ans

METHOD − 2

$5 \times \frac{13.56 \times 20}{6 \times 13 + 5 \times 7} = 12$ Ans

8.

Let Numbers are a, b, c

$\frac{a+b}{2} + c = 164$

$\frac{b+c}{2} + a = 158$

$\frac{a+c}{2} + b = 132$

Average of a, b and c

= $\frac{164 + 158 + 132}{2 \times 3}$

= $75\frac{2}{3}$ Ans

9.

(a + b + c) : (d + e + f)

2 : 1

Required Sum = $\frac{15 \times 6}{3}$ = 30

10.

B : G

5 8

x + 2.6 x

$x + \frac{2.6 \times 5}{13} = 50$

x = 49 kg Ans

11.

METHOD − 1

12 → 18.5

6 → 16.8 (−1.7 × 6)

7 → 17.4 (−1.1 × 7)

Net deviation = −17.9

Average of Remaining No. → $18.5 + \frac{17.9}{11}$

METHOD − 2

$18.5 - \frac{-1.7 \times 6 - 1.1 \times 7}{11}$ = 20.1% Ans

12.

A = 3B + 6

(A + 3) = (B × 3) 2 + 8

3B + 9 = 2B + 14

B = 5, A = 21

Required Average = $\frac{A+B}{2}$ = 13 yr Ans

13.

80 − 41 = 39 Ans

14.

$15.5 + \frac{24}{24} + 24 = 40.5$ Ans

15.

$\frac{9.5 + 18}{2.5} = 11$ Ans

16.

$2\begin{pmatrix} 30 & \text{——} & 88 \\ 28 & \text{——} & 87.5 \end{pmatrix} 0.5$

= 28 × 0.5 + 88 × 2 = 190

A + B = 190

A − B = 2

A = 96 Ans

17.

M = N + 10

$(N+10)^2 - N^2 = 600$

20N = 500, N = 25 M = 35

Required Average = $\frac{3M + 5N}{2} = \frac{3 \times 35 + 5 \times 25}{2}$

= 115 Ans

18.

(24 + 1) + (25 + 2) + (2 + 3) + (35 + 4) ..... + 74 + 10 = 55 × 10

a + b = 550 − (1 + 10)/2 × 10 − (24 + 45 + 35 + 59 + 83 + 46 + 29 + 74)

a + b = 100

Required Average → $\frac{a+b}{2} = \frac{100}{2}$ = 50 Ans

19.

(10x + y) − (10y + x) = 6 × 9

x − y = 6 Ans

20.

$\frac{40 - (n+4)}{4} + 1 = \frac{30 - (n+5)}{1}$ ∵ n → Average

40 − n − 4 + 4 = 120 − 4n − 20

n = 20

So, $\frac{40 - 20}{4}$ = 5 (New Number)

Original = 5 − 1 = 4 Ans

21.

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$P+Q+R \rightarrow 62\times3$

$R = P+12 = Q+9$

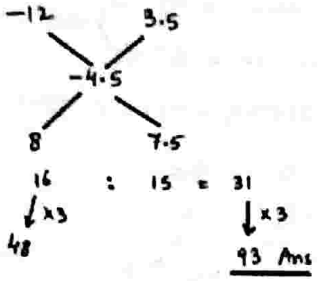
$R-12+R-9+R = 62\times3$

$R = 62+7 = 69$

$S = 54$

Required Average $= 62-\frac{8}{4} =$ **60 kg Ans**

22.



16 : 15 = 31

$\times3$ ↓ ↓ $\times3$

48 — 93 Ans

23.

$\frac{4\times5}{0.8} = 25$

No. of students initially $= 25-5 =$ **20 Ans**

24.

Avg	6th	7th	8th
17	20	22	24

Required Average $\rightarrow \frac{20+22+24+36+53}{5}$

$=$ **31 Ans**

25.

10	32.5	-6.9×4
4	25.6	$+5.7\times3$
3	38.2	

Net Deviation $\rightarrow -10.5$

Now,

5th	6th	7th
3x	2x	3x+8

$3x+2x+3x+8 = 32.5\times3+10.5$

$x = 12.5$

Required Average $= \frac{5^{th}+7^{th}}{2}$

$= 3x+4 =$ **41.5 Ans**

26.

30	512	$+3\times20$
20	515	-2×13
13	510	

Net deviation $= 34$

Required Average

$= \frac{19^{th}+20^{th}}{2} = 512+\frac{34}{2}$

$=$ **529 Ans**

27.

$(m-4),(m-2),m,(m+2),(m+4)$

$(m-4)^2+(m+4)^2+m^2+(m+2)^2+(m-2)^2 = 233\times5$

$2m^2+32+m^2+2m^2+8 = 233\times5$

$5m^2 = 233\times5-40$

$m = \sqrt{233-8} = 15$ {middle term = 15}

Required average $\rightarrow \frac{m-4+m+4}{2} = m \Rightarrow$ **15**

28.

60	29,900	$+60,100\times2$
2	90,000	$+35,100\times8$
8	65,000	

$29900-\frac{120200+280800}{50} =$ **21,880**

29.

$\frac{27+10+18}{5} =$ **11 Subject Ans**

30.

$(45.5-44.2)\times40 = 52$

Means +26 and −26

it is done by 2 person

but for one person

+13 −13

So, $48.75-13 =$ **35.75 Ans**

31.

$\frac{-4\times5}{n+5} = \frac{-5\times3.2}{n-5}$

$\frac{n+5}{n-5} = \frac{5}{4} \Rightarrow n =$ **45 Ans**

32.

$n(n+1) = 10\times16 =$ **160 Ans**

33.

Multiple of 2 from 1 to 50

$= \frac{2+50}{2} = 26$

Multiple of 5 From 1 to 50

$= \frac{5+45}{2} = 25$

10, 20, 30, 40, 50 counted in multiple of 2

$\Rightarrow 25+\frac{1\times25}{30}$

34.

$\frac{-5.1\times12-3.4\times7}{34}\times10 = 25$

$n+12-7 = 25, \quad n =$ **20 Ans**

35.

18	42	-2×10
10	40	$+2\times5$
5	44	

6th	7th	8th
x+6	x	x+7

$3x+13 = 42\times3+10$

$x = 41$

Required average $= \frac{6^{th}+8^{th}}{2} = \frac{47+48}{2} =$ **47.5 Ans**

36.

201 < $13^2 = 169$, $15^2 = 225$

So numbers are, 11, 13, 15, 17

Required average $= \frac{17\times7+11\times3}{2} =$ **76 Ans**

37.

M	F	C	
20	x	y	$= 44$ $\quad x+y=24$
54	49	30	$= 48.25$

Let Avg = 49

$20\times5+x\times0-19\times y = -44\times0.75$

$x = 17, \quad y = 7$

Difference $= 17-7 =$ **10 Ans**

38.

Let $x = 10k, \ y = 8k, \ z = 5k$

$\frac{1}{x}+\frac{1}{y}+\frac{1}{z} = \frac{3\times17}{240}$

$\frac{1}{k}\left(\frac{1}{10}+\frac{1}{8}+\frac{1}{5}\right) = \frac{51}{240}$

$k = 2$

Now, $x = 20, \ y = 16, \ z = 10$

$\frac{3\times20+5\times16}{2} =$ **70 Ans**

39.

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12 —— x
13 —— x+5) +5

$5\times12 + 1(x+5) = 97$

$x+5 = \underline{37 \text{ Ans}}$

A	B	C
30	25	20
17.25		
57.5	54.5	52

A	C
57.5	52
30	20

55.3

Required Average = $\underline{55.3 \text{ Ans}}$

1.

$30x = 20\times880 + 10(x+110)$

$3x = 1760 + x + 110$

$x = 935$

Total = 935×30

= $\underline{28050 \text{ Ans}}$

2.

48.2) −3.2×15
45) +2.3×22
50.5

38th	39th	40th
x+1	x	x+3

t deviation = 2.6

$3x+4 = 48.2\times3 - 2.6$

$x = 46$

Required Average = $\frac{39^{th}+40^{th}}{2} = x + \frac{3}{2} = \underline{47.5 \text{ Ans}}$

43.

7 Member Average age = 35 year

15 years back = 35 − 15 = 20 year

Sum = 20×7

Average = $\frac{140}{5} = \underline{28 \text{ Ans}}$

44.

2004 2005 2006 2007 = 18950) 2775
2005 2006 2007 2008 = 21725

2008 − 2004 = 2775×4

12750 − x = 11100

x = $\underline{1650 \text{ Ans}}$

45.

a + b = 16
b + c = 10
c + d = 8

a + b + c + d = 4(2d − 4)
16 + 8 = 4(2d − 4)
d = 5
So, c = 3, b = 7, a = 9

e = a + d + 1
e = 15

Required Average = $\frac{e+d}{2} = \frac{15+5}{2} = \underline{10}$

46.

$+(58-54)\times8 - (58-53.6) - 4 - 0.6$

Net deviation = 23 kg

Number of Students Now,

$\frac{23000}{575} = 40$

Number of Students initially,

40 + 8 − 3 = $\underline{45 \text{ Ans}}$

47.

METHOD − 1

Boys 161.2 — Girls 152.7

154.2

4 : 15
1.78 — 6.7

Average = $\underline{152.7 \text{ Ans}}$

METHOD − 2

Boys 4 → 161.2
Girls 15 → 154.5
= 19

$154.5 - \frac{6.7\times4}{15} = \underline{152.7 \text{ Ans}}$

48.

First three match Average score = 122
Sum = 122×3 = 366

Average in four Match = 130
Sum = 520

4th Match Run = 154

5th Match = 154 − 14 = 140

Last Four Match Average = 164

2nd + 3rd + 4th + 5th = 164×4

2nd + 3rd + 154 + 140 = 656

2nd + 3rd = 362

First Match = 366 − 362 = $\underline{4 \text{ Ans}}$

49.

Month starts with Monday

Sunday = 4 —— 538) 301
Other days = 27 —— 237

Required Average = $237 + \frac{301\times4}{31}$

= $\underline{276 \text{ Ans}}$

50.

Base Average = 50.5

Deviation = 25(−5.5) + 18(5.5)
= −38.5

28th Number = 67

Deviation = 67 − 50.5 = +16.5

Remaining Average Deviation
= −38.5 + 16.5 = −22

After Excluding 26th and 27th Number we have 44 Number

= $\frac{-22}{44} = -0.5$

Required Average = 50.5 + 0.5 = $\underline{51}$

51.

5th	6th	7th
x+6	x	x+5

12 —— 42) −2×5
5 —— 40) +2×4
4 —— 44

Net deviation = −2

$3x + 11 = 42\times3 + 2$

$x = 39$

Required Average = $x + \frac{5}{2}$

= 39 + 2.5 = $\underline{41.5 \text{ Ans}}$

52.

Average of Eleven consecutive Positive Integer = d

One consecutive number decreases = 0.5

and two number decreases = 1

So, the Average will be decreased by 1 Ans

53.

$\frac{350\times25 - 10\times350}{21} = 250$

Boys were shifted

350 − 250 = $\underline{100 \text{ Ans}}$

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54.

Average sales for Sunday and Saturday = 300

Remaining five days = 200

For a month starts with Saturday = 10 sat and sunday

$300 \times 10 + 200x = 7000$

$4000 = 200x$

$x = 20$ days

Total days = $10 + 20 = \underline{30 \text{ April}}$

55.

Numbers = N

If we misplace one even no with next odd no. then Sum Increases = 1

Average increases = $\frac{1}{N}$

$\frac{125}{10000} = \frac{1}{N}$

$N = \underline{80 \text{ Ans}}$

56.

Average monthly Expenditure of a family

$10000 \times 3 = 30000$

$12500 \times 4 = 50000$

$13500 \times 5 = 67500$

147500 — Expenditure

Total Saving during the year = 32500

Average monthly Income = $\frac{147500 + 32500}{12}$

= 15000 Rs.

57.

Let number = $100x$

Average of 40% and 33% = 73

$\frac{40x + 33x}{2} = 73$

$x = 2$

Number = 200

Average of $\frac{1}{5}$th and $\frac{1}{4}$th of number

$= \frac{40 + 50}{2} = \underline{45 \text{ Ans}}$

58.

Average speed = $\frac{\text{Total distance}}{\text{Total time}}$

Distance = $2 \times 70 + 3 \times 80 + 1 \times 40 = 420$ km

Time = $2 + 3 + 1 = 6$ hr

Average speed = $\frac{420}{6} = \underline{70 \text{ km/hr Ans}}$

59.

Base Average = 64

Net Deviation = $+13(-1.2) + 13(+8.2)$

$= 91$

12th Number = 61

Deviation = $61 - 64 = -3$ (13th number)

Required Average = $64 - \frac{91 - 3}{23}$

$= \underline{60.2 \text{ Ans}}$

60.

Avg of even no

$= \frac{n(n+1)}{n}$

$= \frac{148 \times 149}{148} = 149$

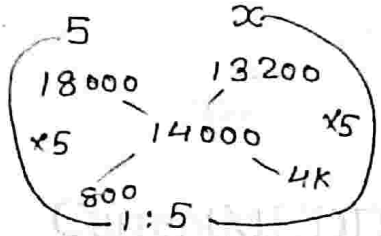
Avg of odd no

$= \frac{n^2}{n}$

$= 129$

$149 - 129 = 20$

61.



$x = 5 \times 5 = 25$

$\Rightarrow 25 + 5 = 30$

62.

$\text{Sum} = 5r^4 + rs^4$

$\text{Avg} = \frac{5r(r^3 + s^3)}{r+s}$

$= \frac{5r(r+s)(r^2 + s^2 - rs)}{(r+s)}$

$= 5r(r^2 + s^2 - rs)$

63.

I $\frac{49 \times 39 - 7 \times 40 + 7 \times 54}{49}$

II $39 + \frac{(-1 \times 7 + 15 \times 7)}{49}$

$39 + \frac{98}{49}$

$= 41$

64.

Total = 60×62

$= 3720$

$60B + 65G = 3720$

$B + G = 60 \times 65$

$-5B = -180$

$B = 36$

65.

R S Ro Ri m

x x+4 x+8 x+12 x+16

m - R = x + 16 - x

= 16

66.

120 m —— 62.5

$\frac{120 \times (-4.3)}{30} = -17.2$

New Avg = $58.2 - 17.2$

$= 41$

67.

Avg = x

x - 2, x + 4, x + 8, x + 10

$-2 + 4 + 8 + 10$

Deviation = 20

For 10 girls = $\frac{20}{10} = +2$

New Avg = $x + 2$

68.

1st 3 Avg = $75 \times 3 = 225$

last 3 Avg = $82 \times 3 = 246$

471

3rd No 2 times -66

405

Avg = $\frac{405}{5} = 81$

69.

18, 36, 54, 72, 90 ....

Avg = $\frac{\text{middle two No}}{2}$

$= \frac{72 + 90}{2}$

$= 81$

70.

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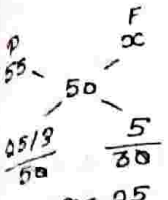


$50 - x = \frac{25}{3}$

$x = 41.66$

71.

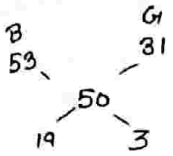
$\frac{x+y}{2} + 35 = \frac{y+2}{2}$

$x + y + 70 = y + 2$

$x + y + 70 = y + 85$

$x = 15$

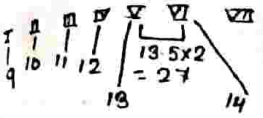
72.



$19 \times 53 : 31 \times 3$

$1007 : 93$

73.



Sum $= \frac{11+12}{2} \times 6 = 69.$

74.

$Avg = \frac{First + Last}{2}$

$35 \times 2 = Smallest + Largest$

$= 70.$

75.

Ram + Shyam = $28 \times 2 = 56$

Rahim + Shyam = $26 \times 2 = 52$

Rahim + Ram = $30 \times 2 = 60$

Ram + Shyam + Rahim = 84

32 24 28

76.

Sum = 10A

$(10 - 2 + 3)B = 11B$

$11B - 10A = 56 \times 3 - 48 \times 2$

$11B - 10A = 72$

$A + B = 438$

$A = 226$

$B = 212$

$A - B = 14$

77.

$7A = 5$

$Sat = 5$

$Sum = 4$

$5 \times 254 + 4 \times 625 + 22x = 31 \times 238$

$x = 164$

78.

B	G
140	100
7	5

Score 10 : 13

$7 \times 10x + 5 \times 13x = 63 \times 12$

$135x = 756$

$x = \frac{756}{135}$

$13x = \frac{756}{135} \times 13$

$= 72.8$

79.

$37 + \frac{19}{2}$

$= 46\frac{1}{2}$

80.

Total Student = 26

avg exp = A

Total " = 20A

$19 \times 175 + 1 \times (A + 19) = 20A$

$3325 + A + 19 = 20A$

$19A = 3344$

$A = 176$

Total exp = 176×20

$= 3520$

81.

दिन = 6

$6 \times 8000 = 48000$

$7236 + 6435 + 6927 + 6855 + 6562 = 34009$

$48000 - 34009 = 13991.$

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82.

$12 \times 66 - 2A + 2x = 12 \times 65$

$C = x = 65$

$2A = 12 + 2 \times 65$

$2A = 142$

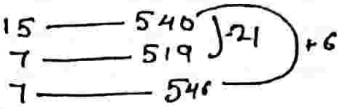
$A = 71$

83.

$\frac{53 + 59 + 61 + 67 + 71 + 73}{6}$

$= \frac{384}{6} = 64.$

84.



Deviation = $(-21 + 6)7 = -105$

आठवां दिन = 540 + 105

= 645

85.

$A + B + C = \frac{3}{13}$

$A = \frac{1}{7}, B = \frac{1}{8}$

$C = \frac{3}{13} - \frac{15}{56}$

$= \frac{-27}{728}$

86.

$25 \times 4 + 30 \times 4 - 27 \times 7$

$= 31$

87.

$\frac{160 + 150 + 420}{250}$

$\frac{730}{250} = 2.92$

88. THE END.

TIME & WORK

CGL PRE 2018

Q.1 To do a certain work, A and B work on alternate days, with B beginning the work on the first day. A can finish the work alone in 48 days. If the work gets completed in $11\frac{1}{3}$ days, then B alone can finish 4 times the same work in:
(a)24 days (b)32 days (c)27 days (d)30 days

CHSL 2018

Q.2 A, B and C can finish a task in 42 days, 84 days and 28 days, respectively. A started the work. B joined him after 3 days. If C joined them after 5 days from the beginning, then for how many days did A work till the completion of the task?
(a)20 (b)15 (c)17 (d)18

Q.3 A and B can complete a piece of work in 15 days and 10 days respectively. They got a contract to complete the work for ₹ 35,000. The share of A in the contracted money will be:
(a)7000 (b)15000 (c)14000 (d)21000

CPO 2018

Q.4 6 men or 5 women earn ₹14,820 in two days. How much will 4 women and 6 men earn in one day?
(a)13,338 (b)13,832 (c)26,676 (d)27,664

Q.5 A can do a work in 20 days, while B can do the same work in 25 days. They started the work jointly. Few days later C also joined them and thus all of them completed the whole work in 10 days. All of them were paid total of ₹ 700. What is the share of C?
(a)55 (b)65 (c)75 (d)70

CGL MAINS 2018

Q.6 25 persons can complete a work in 60 days. They started the work. 10 people left the work after x days. If the whole work was completed in 80 days, then what is the value of x?
(a)15 (b)8 (c)12 (d)30

Q.7 A can do a piece of work in 12 days. He worked for 6 days and left, and then B finished it in 10 days. If both work together, then in how many days will they finish the same work?
(a)9.5 (b)9 (c)7.5 (d)7

SSC CHSL 6 August 2021

Q.8 A earn ₹640 per day and works for 8 hours. B earns ₹360 per day and works for 6 hours. The ratio of per day wages of A to that of B is:
(a)5:4 (b)9:16 (c)16:9 (d)4:5

SSC CHSL 8 July 2019

Q.9 A can do a work in $7\frac{1}{2}$ hours and B can do the same work in $10\frac{1}{2}$ hours. If they work together for $3\frac{1}{2}$ hours, then what part of the work will be left out?
(a)$\frac{3}{5}$ (b)$\frac{4}{5}$ (c)$\frac{1}{5}$ (d)$\frac{2}{5}$

SSC CHSL 13 April 2021

Q.10 A, B and C can complete a work alone in 400, 600 and 900 days respectively. In how many days can the work be completed if it is started by A and he is assisted by B and C on every second and third day respectively?
(a)292 (b)270 (c)240 (d)293

SSC MTS 14 August 2019

CGL PRE 2020

Q11 To do a certain work. A and B work on alternate days with B beginning the work on the first day. A alone can complete the same work in 24 days. If the work gets completed in $11\frac{1}{3}$ days, then B alone can complete $\frac{7}{9}^{th}$ part of the original work in:
(a) $5\frac{1}{2}$ days (b)4 days (c)$4\frac{1}{2}$ days(d)6 days

Q.12 A and B can complete a work in 15 days and 10 days respectively. They started doing the work together but after 4 days B had to leave. Then A working with a new worker C completed the remaining work in 3 days. If C works alone, in how many days he can do 40% of the same work?
(a)9 (b)8 (c)10 (d)$8\frac{1}{2}$

Q.13 Samir and Puneet can complete the same work in 10 days and 15 days respectively. The work was assigned for ₹4500. After working together for 3 days Samir and Puneet involved Ashok. The work was completed in total 5 days. What amount (in ₹) was paid to Ashok?
(a)750 (b)1500 (c)1071 (d)800

Q.14 Each one of five men independently can complete a work in 20 days. The work is started by one person. Next day one more person joins and every next day one

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more person joins. From the fifth day, five persons continued working as a team. In how many days, will the work be completed?
(a)2 (b)6 (c)3 (d)5

Q.15 Five men can complete a work in 20 days. Ten women can complete the same work in 15 days. Two men and six women started working together. After 5 days, three women left the work and a new man joined the work. The group continued working together till the end of the work. In how many days will they be able to do the remaining work?
(a)14 (b)19 (c)$18\frac{1}{3}$ (d)$16\frac{2}{3}$

Q.16 Fourteen persons can do a work in 18 days. After 5 days of work, 6 workers left the work, and joined back on the last day of the work. In how many days the work got completed?
(a)24 (b)12 (c)21 (d)27

Q17 A can do a piece of work in 2 days, and B can do five times the same work in 15 days when they work for ten hours a day. If they work together, then how many hours in addition to a days' work will they require to complete the work?
(a)2 (b)1 (c)0 (d)3

Q.18 To do a certain work, the ratio of efficiencies of X and Y is 5: 4. Working together, X and Y can complete the same work in 10 days. Y alone starts the work and left after 5 days. X alone will complete the remaining work in:
(a)10 days (b)14 days (c)12 days (d)15 days

Q.19 A can complete a work in $11\frac{1}{2}$ days. B is 25% more efficient than A and C is 50% efficient than B. Working together A, B and C will complete the same work
(a)8 days (b)4 days (c)3 days (d)5 days

Q.20 Eighteen men can complete a work in 14 days. Three women do as much work as two men. Five men and six women started the work and continued for 4 days. Subsequently 3 more men joined the group. In how many total days was the work completed?

(a)$21\frac{1}{3}$ (b)$17\frac{1}{3}$ (c)18 (d)22

CGL 2020

Q.21 A can complete a certain work in 30 days. He started the work. After 4 days B joined him and the whole work was completed in 20 days from the beginning, B alone can complete one-third of the same work in:
(a)16 days (b)13 days (c)10 days (d)18 days

Q.22 Sachin alone can complete a piece of work for ₹8,500 in $8\frac{1}{2}$ days. But with the help of Vishnu, the work is completed in 6 days. The share to be paid to Vishnu is:
(a)₹3,200 (b)₹2,500
(c)₹2,400 (d)₹2,000

Q.23 Geeta can assemble a toy in 10 minutes, whereas Sudha can assemble the same toy in 15 minutes. If they work together, how much time will they take to assemble 60 toys?
(a)6 hours (b)5 hours
(c)7 hours (d)7 hours 30 minutes

SSC SELECTION PHASE IX

Q24 To do a certain work, A is 40% more efficient than B. working together, they can do the same work in 15 days. A started the work and left after 15 days. B and C together completed the remaining work in next 10 days. C alone can do one-third of the original work in:

(a) 21 days (b) 24 days (c) 30days (d) 36 days

Q25 A and B can do a certain work in 27 days and 36 days, respectively. A worked for a few days and then B joined him. They together worked till the completion of the work. If the work got completed in a total of 18 days, then for how many days did A and B work together?
(a) 10 (b) 15 (c) 18 (d) 12

Q26 A can finish 50% of a work in 30 days. He works at it for 15 days and then B alone finishes the remaining work in 30 days. In how many days can A and B working together finish 25% of the whole work?
(a) 9 (b) 6 (c) 8 (10)

Q27 A, B and C can do 50% of a work in 15 days, 12 days and 20 days, respectively. They began the work together but A left 2 days before the completion of the work. In how many days was the work completed?
(a) $7\frac{2}{3}$ (b) $9\frac{2}{3}$ (c)$11\frac{2}{3}$ $(d)10\frac{2}{3}$

Q28 A can do 50% of a work in 20 days and B can do $66\frac{2}{3}\%$ of the same work in 40 days. Both work together for 6 days. The remaining work is completed by C alone in 12 days. Working together, A, B and C will complete the same work in:
(a)$10\frac{3}{5}$ $days$ (b)$9\frac{3}{5}$ $days$ (c)$7\frac{3}{5}$ $days$ (d) $8\frac{3}{5}$ $days$

Q29 Pipes A and B can fill a tank in 18 hours and 24 hours, respectively, while pipe C alone can empty the

full tank in 30 hours. Pipes A and B are opened together for 6 hours and then A is closed and C is opened instantly (with B). after closing of pipe A, now how much time (in hours) will B and C together take to fill the tank completely?

(a) 45 (b) 50 (c) 42 (d) 48

Q30 Pipes A and B can fill a tank in 4 hours and 6 hours 40 minutes respectively while a third pipe C can empty a completely filled tank in 1 hour 40 minutes. A and B open at 2:00 PM and 3:00 PM respectively and C opens at 4:00 PM. When will the tank be completely empty

(a)7:10pm (b) 7:15pm (c) 7:00pm (d) 7:20pm

SSC CGL PRE 21

Q31. Person A can do one-fifth of the work in 3 days, while B's efficiency is half of that of A. in how many days A and B working together can do half of the work?

a) 4 b) 7 c) 6 d) 5

Q32. A man, a woman and a boy can complete a work in 3, 4 and 12 days, respectively. How many boys must assist one man and one woman to complete the same work in one day?

a) 9 b) 5 c) 4 d) 7

MTS 2020

Q33. Two men A and B. each working alone by working 12 hours per day, can complete a work in 20 days. For execution of the work. It was decided that A and B would be working for 8 and 6 hours per day, respectively, on alternate days starting with A. if it takes X days and Y hours to complete the work then (X,Y) is:

(a) (34,4) (b) (33,4) (c) (33,2) (d) (34,2)

Q34. During rainy season. Surge inflow of water takes place into a reservoir. Measures are taken to clear the reservoir while water keeps flowing into it at a constant rate. It has been observed that seven and five men can clear the reservoir in 20 and 50 days, respectively. With the initial quantity of water in the reservoir being 24 and 36 kiloliters, respectively. What is the rate of inflow of water into the reservoir in liters per day?

(a) 600 (b) 480 (c) 640 (d) 540

Q35. 5 men and 6 women can earn Rs 10,500 in 6 days. 8 men and 12 women can earn Rs 24,800 in 8 days. In how many days will 7 men and 10 women earn Rs 26,500

(a) 12 (b) 14 (c) 10 (d) 15

Q36. 4 men and 5 women can earn Rs 8,800 in 8 days. 7 men and 10 women can earn Rs 10,250 in 5 days. In how many days will 8 men and 12 women earn Rs 21,600?

(a) 9 days (b) 10 days (c) 8 days (d) 12 days

Q37. For persons P,Q,R were enfafed for doing a task, with the condition that P,Q,R,S work, respectively,on(Mondays,Thrusdays);(Tuesday,Fridays) ;(Wednesdays,Saturdays);(Sundays). The task was began on a Monday and got completed on the 15th day, which was also a Monday. If the efficiencies of P,Q,R,S in respect of doing this task were in the proportion 1:2:3:4, then in how many days could R completed the task,working alone without break?

(a) 12 (b) 13 (c) 10 (d) 11

Q38. Five men working together can complete a work in 8 days. Om Prakash who can complete the same work independently in 24 days joined them after 4 days. Under the circumstances in how many days the work will completed?

(a) 3 (b) 4 (c) 7 (d) 5

Q39. A labourer was engaged for a certain number of days for Rs 8,500. but due to his absence for some days, he was paid Rs 6,050 only. Find the number of days that he was absent.

(a) 49 (b) 45 (c) 42 (d) 44

Q40. A can do a piece of work in 12 days for 6 hours per day, and B can do it in 8 days for 7 hours per day. How long will they take to do the work, working together, for 9 hours a day?

(a) 4 days (b) $\frac{9}{2}$ days (c) $\frac{5}{72}$ days (d) $\frac{7}{2}$ days

SSC CGL MAINS 2021

Q41. A can do 1/4 part of a work in 9 days. B can do 2/3 part of the same work in 28 days. Working together, in how many days can A and B complete the whole work?

a) 261/15 days b) 198/17 days
c) 262/11 days d) 252/13 days

Q42. A alone can do 2/5 of a work in 12 days. B is 25 percent more efficient than A. C alone can do the same work in 12 days less than B. D is 25 percent less efficient than C. If they all work together, then work will be completed in how many days?

a) 300/47 b) 200/51 c) 240/53 d) 180/43

DP 2022

Q43. A and B together can do a piece of work in 18 days. B and C together can do the same work in 24 days and A and C together can do the same work in 27 days. In how many days will A, B and C complete the entire work, working together?

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a) $14\frac{26}{29}$ b) $14\frac{13}{19}$ c) $7\frac{13}{29}$ d) $7\frac{13}{19}$

Q44. In a workshop, Saral and Kanika are working on alternate days. Saral on the 1st day, Kanika on the 2nd day. Saral on the 3rd day so on. Saral alone can complete the work in 15 days, while Kanika alone takes 18 days to finish the same work. In how many days will they complete the work if they work on alternate basis?
a) $15\frac{1}{4}$ b) $15\frac{1}{3}$ c) $16\frac{1}{3}$ d) $14\frac{1}{4}$

Q45. Kiran, Vishal and Dinesh work in a juice factory. Kiran takes 2 hours to extract as much juice as Vishal can in 3 hours. Dinesh takes 5 hours to extracts as much juice that Kiran extracts in 4 hours. A tank can be filled with juice in 48 hours, if all of them work together. How long will it take to fill the tank, if Dinesh alone is trying to fill the tank?
a) 140 hours b) 135 hours
c) 132 hours d) 148 hours

Q46. A can do a piece of work in 120 days and B can do it in 150 days. They work together for 20 days. Then, B leaves and A alone continues the work. 12 days after that C joins A and the work is completed in 48 days more. In how many days can C do it, If he works alone?
a) 280 days b) 320 days c) 240 days d) 270 days

Q47. A and B undertake a contract of a task for Rs7500. A can do complete the task all alone in 50 days and B can complete the same task all by himself in 60 days. However, to finish the work early, they take C's help and complete the entire work in 20 days. What is the difference (in Rs) between B's and C's share for their contribution in completing the task?
a) 2,000 b) 250 c) 500 d) 1,500

Q48. A, B and C do a piece of work in 18 days, 24 days and 36 days, respectively. On the first day A is assisted by B, and on the second day C assists A. This 2-day cycle is repeated starting with A and B, till the work gets completed. How long (in days) would it take to complete the work?
a) 12 b) 10 c) 11 d) 13

CPO PRE 22

Q49. To do a certain task X would take 3 times as long as Y and Z together; and Z would takes 4 times as long as Y and X together. Three of them together can complete the task is 10 days. How much time is taken by X and Z to complete the task?
a) $18\frac{2}{9}$ days b) $20\frac{1}{9}$ days c) $21\frac{1}{9}$ days d) $22\frac{2}{9}$ days

Q50. 60 men can complete a work in 40 days. They start work together but after every 10 day, 5 men leave the work. In how many days will the work be completed?
a) 47.5 b) 49.5 c) 42.5 d) 45.5

CGL PRE 22

Q51. Abha and Anuj working together completed a job in $\frac{40}{9}$ days. If Abha had worked twice as efficiently as she actually did and Anuj had worked $\frac{1}{3}$ of his actual efficiency, then the work would have been completed in $\frac{60}{17}$ days. Find the time Abha would take to complete the work alone.
a) 10 days b) 8 days c) 12 days d) 6 days

Q52. Ten men begin to do a work. But after some days, four of them left the job. As a result, the job that could have been completed in 40 days is completed in 50 days. How many days after the commencement of the work did the four men leave?
a) 30 b) 20 c) 35 d) 25

Q53. 40 men can complete a work in 15 days. Three days after they started working, 20 more men joined them. In how many days the total work will be completed?
a) 12 b) 13 c) 11 d) 10

Q54. If one man or two women or four boys or five girls can finish a work in 39 days, then how many days will one man, one women, one boy and one girl together take to finish the same work?
a) 40 b) 10 c) 30 d) 20

Q55. A civil contractor planned to build an over bridge of 3 km distance in 600 days. For this purpose, he employed 90 workers. After 200 days of work. It was observed that only 0.5 km of the bridge was completed. What is the number of extra workers required to complete the work in time?
a) 100 b) 140 c) 125 d) 135

Q56. 12 men and 12 women can compete a piece of work in 9 days. 6 men and 15 women can complete the same work in 12 days. How long (in days) would it take 9 women to complete half the work?
a) 36 b) 12 c) 18 d) 24

Q57. In a partnership firm two partners, Vijay and Praveen are working on an assignment. It will take 12 weeks for Vijay to complete the entire assignment alone, while Praveen will take 8 weeks to complete it alone. Due to work pressure, they decided to work on that assignment on the alternate week basis. In the first week Praveen will work and in the second week Vijay will work and so on. In how many weeks the work will be completed if they work on alternate week basis?
a) 8 b) 8.5 c) 9.5 d) 9

Q58. Two persons A and B working separately can sanitise a building in 6 and 10 hours, respectively. They work in stretches of one hour alternately. If A begins at 8 a.m., then in how many hours the work will be finished ?
a) $9\frac{1}{3}$ h b) $7\frac{1}{3}$ h c) $6\frac{1}{3}$ h d) $8\frac{1}{3}$ h

Q59. 5 men and 8 women can complete a work in 12 days working together, while 3 men and 7 women together can complete the same work in 15 days. In how many days will 11 women compete the same work?
a) 12 b) 8 c) 6 d) 16

CHSL PRE 2022

Q60 The ratio of time taken in completing a work by a man and woman is 2 : 3. The man and the woman can complete

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the work together in 24 days. In how many days can the woman complete the work alone ?
a) 20 days b) 40 days c) 60 days d) 30 days

Q61 S does half as much work as T in 1/8 of the time taken by T. If they together complete a work in 60 days, then how many days shall S alone take to complete that work?
a) 100 days b) 80 days c) 75 days d) 90 days

ICAR & Selection Phase XI

Q62 Maya completes $\frac{7}{10}$ of a work in 15 days and then she completes the remaining work with the help of Suresh in 4 days. In how many days can Maya and Suresh complete the whole work?
1. $\frac{32}{3}$ 2. $\frac{35}{3}$ 3. $\frac{40}{3}$ 4. $\frac{38}{3}$

Q63 Shivam can do a piece of work in 6 days and Vivek in 24 days. They started work together but Shivam left the work 3 days before its completion. In how many days was the work completed?

1. $7\frac{2}{5}$ days 2. $7\frac{3}{5}$ days 3. $7\frac{4}{5}$ days 4. $7\frac{1}{5}$ days

CGL PRE 2023

Q64 P is two times more efficient than Q. P is able to complete a piece of work in 40 days less than Q. working together, the whole number of days taken by then to complete the work is: (Round off to the nearest interger)
1) 26 2) 25 3) 27 4) 28

Q65 5 women and 9 girls earn a total of Rs 18,720 in 9 days, while 9 women and 16 girls earn a total of Rs 52,080 in 14 days. How much will 12 women and 7 girls together earn (in Rs) in 13 days?
1) 42510 2) 41990 3) 42380 4) 42120

Q66 Ajay and Bharath work on alternate days to do a certain work, Bharath starts from the first day. Ajay alone can complete the work in 32 days. If the work is completed in exactly 8 days, then Bharat alone can do 7 times the same work in _____ days.
1. $\frac{32}{7}$ 2. $\frac{28}{8}$ 3. 4 4. 32

Q67 Ram sells a suitcase to Mohan at a profit of 20%. Mohan sells it to Shyam at 40% profit. If Shyam paid ₹1,430 for it, Ram bought it for _____.
(a) Rs 875 (b) Rs 870 (c) Rs 851.19 (d) Rs 880

Q68 A, B and C can complete a piece of work in 30 days, 40 days and 50 days respectively. If the work starts from A and they work one day alternately, then in how many days the work will be completed?
1. $38\frac{1}{12}$ 2. $36\frac{1}{2}$ 3. 36 4. $39\frac{1}{12}$

Q69 A and B are equally efficient, and each could individually complete a piece of work in 30 days, if none took any holiday. A and B started working together on this piece of work, but A took a day off after every four days of work, while B took a day off after every five days of work. If the duo had started work on 01 August 2022, on which date was the work completed?
1. 19 August 2022 2. 17 August 2022
3. 16 August 2022 4. 18 August 2022

Q70 P and Q can do a job in 24 days, Q and R can do it in 30 days, while P and R can do it in 40 days. X is four times as efficient as P, Y is half as efficient as Q, and Z is 2.5 times as efficient as R. Determine the number of days required to complete the same job if X, Y and Z work together.
1. 9 2. 12 3. 8 4. 10

Q71 R, S and T can finish a work in 20, 15 and 10 days, respectively. R works on all days and S and T work on alternate days with T starting the work on the first day. In how many days is the work finished?
1. 61/7 2. 50/7 3. 52/7 4. 57/8

Q72 A group of men decided to do a job in 13 days but 9 men left the work after each day. The work, as a result got completed in 16 days. How many men were initially in the group?
1. 378 2. 360 3. 330 4. 380

Q73 A can do 1/3 of a piece of work in 32 days, B can do $37\frac{1}{2}$% of the same work in 24 days, while C can do 60% of the same work in 48 days. B and C together started and worked for x days. After x days, B left the work and A joined C and both completed the remaining work in (x + 8) days. If the ratio of the work done by (B + C) together to the work done by (A + C) together is 9 : 11, then what fraction of the same work can be completed by C alone in 3.5x days?

1. $\frac{18}{25}$ 2. $\frac{4}{5}$ 3. $\frac{7}{10}$ 4. $\frac{3}{4}$

Q74 10 women take 16 days to complete a work which can be completed by 6 men in 8 days. 12 men started working and after 2 days 6 men left, and 5 women joined them. In how many days will the work be completed?
1. $\frac{3}{2}$ 2. $\frac{16}{5}$ 3. $\frac{5}{2}$ 4. $\frac{26}{5}$

Q75 X, Y and Z can complete a work in 5 days, 15 days and 30 days respectively. In how days can the work be completed if X is assisted by Y and Z together, on every second day?
(a) 5 days (b) 4 days (c) 7 days (d) 6 days

Q76 A, B and C can finish a work in 15 days working alternately in the same order. The efficiency of A is the same as that of B, and the efficiency of C is equal to that of A. In how many days will the work be finished if they work alternately in the order C, A and B?
1. 12 2. 14 3. 15 4. 16

Q77 A group of men decided to do a job in 11 days but 16 men left the work after each day. The work, as a result got completed in 15 days. How many men were there initially in the group?
1. 400 2. 480 3. 420 4. 450

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Q78 A man, a woman and a boy can complete a job in 3, 5 and 15 days, respectively. How many boys must assist 1 man and 1 woman to complete the job in 1/5th of a day?
1. 67 2. 35 3. 56 4. 47

Q79 Benny can do a piece of work in 24 days. Chetan and David can do the same work individually in 36 and 48 days, respectively. All of them begin the work together. However, Benny leaves the work 4 days before the completion of work and Chetan leaves the work 10 days before the completion of the work. David worked till the end and completed the work. Find the number of days in which the work was completed?
1. 16 2. 20 3. 18 4. 15

CHSL PRE 23

Q80. Raju and Akber take 4 hours and 6 hours to type 32 pages and 48 pages, respectively, on a computer. They are given an assignment of typing 256 pages. If they work together, typing on two different computers, starting at the same time, how much time will they take to complete the assignment (in hours)?
1. 14 2. 18 3. 16 4. 12

CGL MAINS 23

Q81. A and B can complete a job together in 12.5 days; B and C can complete the same job together in 18.75 days, while C and A can complete the same job together in 15 days. In how many days will A, B and C together be able to complete the same job alongside D, who is only 40% as efficient as C?

(a) $9\frac{17}{27}$ (b) $9\frac{2}{3}$ (c) $9\frac{7}{27}$ (d) $9\frac{1}{3}$

SELECTION PHASE XII

Q82. A, B and C can do the same work in 9 days, 12 days and 18 days, respectively. A started the work and worked for 3 days and left. Then, B joined the work and worked for 3 days and left. Then, C joined the work and completed the work. Find the number of days C took to complete the work.
a) $7\frac{1}{2}$ b) 8 c) 7 d) $8\frac{1}{2}$

Q83. A group of men decided to complete a job in 4 days. However, since 10 men dropped out every day, the job got completed at the end of the 7th day. How many men were there in the beginning?
a) 90 b) 70 c) 140 d) 35

Q84. Two workers - Sagar and Manish - are working on a heavy machine to melt waste metal. Sagar can complete the work in 15 days while both workers on alternate basis can complete the work in 12 days. In how many days can Manish alone complete the work?
a) 10 b) 18 c) 9 d) 30

Q86. At a construction site, 15 men or 10 machines can construct a room in 66 days. In how many days can 5 men and 4 machines together complete the work?
a) 75 b) 80 c) 90 d) 85

Q87. A garrison of 140 men has provisions for 35 days. At the end of 10 days, 35 more men joined them. How many days can they sustain on the remaining provisions?
a) 10 b) 35 c) 20 d) 25

Q88. 3 men can finish a work in 10 days, 4 women can finish it in 12 days and 10 qualified workers can finish it in 6 days. In how many days is the work finished by 4 men, 4 women and 4 qualified workers, working together every day?
a) 30/19 b) 45/17 c) 60/19 d) 60/17

CPO 2024

Q89. A can complete a piece of work alone in 200 days, while B can complete the same piece of work alone in 100 days. In every three-day cycle, both A and B work on day 1, only A works on day 2, and only B works on day 3. This cycle continues till the work is completed. How many days in all does it take the duo to complete the work?
a) $100\frac{1}{3}$ b) $99\frac{2}{3}$ c) $100\frac{1}{2}$ d) 100

Q90. A and B together can complete a piece of work in 25 days, B and C together can complete the same piece of work in 36 days, while C and A together can complete it in 30 days. If A, B, C, and D together can complete this piece of work in 18 days, then in how many days can D alone complete this piece of work?
a) 225 b) 210 c) 200 d) 180

Q91. A hostel had food provision for 300 students for a month. After 20 days, 50 students left the hostel. How long would the remaining food last? (1 month = 30 days)
a) 10 days b) 14 days c) 12 days d) 16 days

Q92. Amita can build a room in the same amount of time that Bina and Sita working together can build. If Amita and Bina together could do it in 25 days and Sita alone in 35 days, then how many days are required for Bina alone to do the same work?
a) 152 Days b) 175 Days
c) 165 Days d) 180 Days

CHSL 2024

Q93. At the beginning of day 1 of a month, Rajesh has 500 eggs. He sells 20% of the eggs by the end of the day and added b% of the eggs at the beginning of the next day and sold 20% of the eggs at the end of the next day. This pattern continued up to the end of the third day of the month when he is left with 1024 eggs. The value of b is equal to:
a) 20 b) 10 c) 500 d) 100

Answers

1	C	2	C	3	C
4	A	5	D	6	D
7	C	8	C	9	C
10	A	11	D	12	A

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13	A	14	B	15	A
16	D	17	A	18	B
19	B	20	D	21	A
22	B	23	A	24	B
25	D	26	B	27	D
28	B	29	B	30	B
31	D	32	B	33	D
34	B	35	C	36	A
37	D	38	C	39	A
40	D	41	D	42	C
43	A	44	C	45	D
46	C	47	C	48	C
49	D	50	A	51	B
52	D	53	C	54	D
55	D	56	C	57	C
58	B	59	A	60	C
61	C	62	C	63	D
64	C	65	D	66	D
67	C	68	A	69	D
70	D	71	C	72	B
73	C	74	D	75	B
76	C	77	C	78	A
79	A	80	C	81	C
82	A	83	B	84	A
85		86	C	87	C
88	D	89	B	90	C
91	C	92	B	93	D

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Time & Work

1.

$11\frac{1}{3} \rightarrow$ BA BA ..... BA

B → 6 days, A → $5\frac{1}{3}$ days

Work done by A in $5\frac{1}{3}$ days $= \frac{16}{3\times48} = \frac{1}{9}$

Remaining work done by B in 6 days $= \frac{8}{9}$

Now, B alone can complete 4 times work in

$= \frac{9}{8}\times6\times4 \Rightarrow$ 27 days Ans

2.

A → 42, B → 84, C → 28 — 2 : 1 : 3 — 84 (T.W.)

Work done = A×5 + B×2 = 2×5+2×1 (Till C Joins) ⇒ 12 unit

Remaining $= \frac{84-12}{3+2+1} = 12$ days

work done by A = 12+5 = 17 days Ans

3.

A → 15, B → 10 — 2 : 3 — 30

A	B	
2	3	5
↓		↓ ×7000
14.000 Ans		35000

CurrentMUDDE

4.

$\frac{M}{W} = \frac{5}{6}$ $\qquad \frac{6\times5\times2}{14820} = \frac{(4\times6+6\times5)\times1}{x}$

$x =$ 26676 Ans

5.

A → 20, B → 25 — 5 : 4 — 100

work done by A and B in 10 days

$= 9\times10 = 90$ unit

Left work is done by C → 10 unit

Share of C $= \frac{700}{100}\times10 =$ 70 ₹ Ans

6.

$25\times60 = 25x + 15(80-x)$

$10x = 25\times60 - 15\times80$

$x =$ 30 Ans

7.

A's 6 days left work done by B

In 10 days,

	A	:	B
Days →	6	:	10
Eff. →	5	:	3

Total work = 12×5 = 60 unit

A+B = $\frac{60}{8} \Rightarrow$ 7.5 days Ans

8.

$\frac{A}{B} = \frac{640}{360} = \frac{16}{9}$

9.

A → $\frac{15}{2}$, B → $\frac{21}{2}$ — 14 : 10 — 105

work done together in $\frac{7}{2}$ hr

$= \frac{24\times\frac{7}{2}}{105} = \frac{4}{5}$

Remaining work = $\frac{1}{5}$ Ans

10.

A → 400, B → 600, C → 900 — 9 : 6 : 4 — 3600

1st Day →	9
2nd Day →	9+6
3rd Day →	9+4
3 day →	37 unit
×97	×97
291 →	3589
293 →	3600 +

11.

B → 6 days

A → $5\frac{1}{3}$ days

Work done by A $= \frac{16}{3\times24} = \frac{2}{9}$

Remaining work done by B = $\frac{7}{9}$ in 6 days

12.

A → 15, B → 10 — 2 : 3 — 30

$2\times7 + 3\times4 + C\times3 = 30$

$C = \frac{4}{3}$

$C = \frac{30}{4/3}\times\frac{2}{5} =$ 9 days Ans

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13.

S → 10, P → 15, S+P+A → 5 — 3 : 2 : 6 — 30

Efficiency of A = 6−5 = 1

A = $\frac{4500}{6}\times1 =$ 750 Ans

14.

237 $1+2+3+4+5+6 = 21$, hence 6th day.

15.

$5m \times 20 = 10w \times 15$, Total work $= 5 \times 3 \times 20$

$\frac{M}{W} = \frac{3}{2}$

$\frac{5\times3\times20 - (2\times3+6\times2)\times5}{(3\times3+3\times2)} = \frac{210}{15} = 14$ Days

16.

$\frac{14\times18 - 6\times14}{8} = 21$ days

Total $= 21+6 =$ 27 days

17.

$A \times 2 \times 5 = B \times 15$ Total work $= 3\times2\times10 = 60$

$\frac{A}{B} = \frac{3}{2}$ $\frac{60}{5} = 12$hr

$12hr - 10hr =$ 2hr Ans

18.

x : y Total work $= (5+4)\times10 = 90$

5 : 4

$\frac{90-4\times5}{5} =$ 14 days Ans

19.

A : B : C Total work $= 8\times\frac{23}{2} = 23\times4$

8 : 10 : 5

work completed by A, B & C $= \frac{23\times4}{23} =$ 4 days

20.

M : W Total work $= 18\times3\times14$

3 : 2

$\frac{18\times3\times14 - (5\times3+6\times2)\times4}{(8\times3+6\times2)} + 4$

$\Rightarrow 18+4 =$ 22 days Ans

21.

$A \times 26 = (A+B)16$

$10A = 16B$

$\frac{A}{B} = \frac{8}{5}$

Total work $= 30\times8 = 240$

$B = \frac{240}{5}\times\frac{1}{3}$

$= 16$ Day.

22.

Sachin $\rightarrow \frac{17}{2}$ (12, 17) $\rightarrow$ 102

Sachin + Vishnu $\rightarrow 6$

$\Rightarrow \frac{8500}{17}\times5 =$ 2500 Ans

23.

Geeta $\rightarrow$ 10 min (3)

Sudha $\rightarrow$ 15 min (2) $\rightarrow$ 30

Both can assemble 1 toy in $\rightarrow \frac{30}{5} = 6$ min

1 toy $\rightarrow$ 6 min

60 toy $\rightarrow$ 360 min $=$ 6hr Ans

24.

A : B Total work $\rightarrow 12\times15 = 180$ unit

7 : 5

work done by A $\rightarrow 15\times7 = 105$ unit

Remaining $\Rightarrow$ 75, B in 10 days $\rightarrow 5\times10 = 50$ unit

C worked in 10 days $\Rightarrow \frac{25}{10} = 2.5$

$C = \frac{180\times\frac{1}{3}}{2.5} =$ 24 days Ans

25.

work done by A $= \frac{18}{27} = \frac{2}{3}$

Time taken by B to complete remaining $\frac{1}{3}$ work

$= 36\times\frac{1}{3} =$ 12 days Ans

26.

A can finish 50% of work $\rightarrow$ 30 days

——— 100% ——— $\rightarrow$ 60 days

B Alone finishes remaining 75% work $\rightarrow$ 30 days

——— 100% ——— $\rightarrow$ 40 days

$A+B = \frac{60\times40}{60+40}\times\frac{1}{4} =$ 6 days Ans

27.

A (50%) $\rightarrow$ 15

B (50%) $\rightarrow$ 12

C (50%) $\rightarrow$ 20

A (100%) $\rightarrow$ 30 (4)

B (100%) $\rightarrow$ 24 (5) $\rightarrow$ 120

C (100%) $\rightarrow$ 40 (3)

A left 2 day before, If not left then,

$= 4\times2 = 8$ unit more work

Work completed $= \frac{120+8}{12} = 10\frac{2}{3}$ Days Ans

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28.

A → 40, B → 60 ; 3, 2 ; 120

(A+B) In 6 days = 5×6 = 30

C → $\frac{90}{12} = \frac{15}{2}$

$A+B+C = \frac{120}{3+2+\frac{15}{2}} = 9\frac{3}{5}$ days Ans

29.

A → 18, B → 24, (−)C → 30 ; 20, 15, −12 ; 360

$B+C = \frac{360-35\times6}{3}$

= 50 days Ans

30.

A → 4, B → $\frac{20}{3}$, (−)C → $\frac{5}{3}$; 5, 3, −12 ; 20

$\frac{5\times2+3\times1}{4}$

= 3hr 15 min

7 : 15 Pm Ans

31.

A → 15, B → 30 ; 2, 1 ; 30

$A+B = \frac{30\times\frac{1}{2}}{3}$

= 5 days

32.

M → 3, W → 4, C → 12 ; 4, 3, 1 ; 12

Required work $= \frac{12-4-3}{1} =$ 5 days

33.

Total work = 12×20 = 240

in 2 days → 14

×17 ×17

34 days → 238

remaining → 2 hr

(34, 2) Ans

34.

$\frac{20\times7}{5\times50} = \frac{24+20x}{36+50x}$ x → Rate of Inflow

$x = \frac{48}{4\times25}\times1000 =$ 480 Litre/day Ans

35.

5m + 6w = 1750

8m + 12w = 3100

$M = \frac{1750\times2-3100}{2} =$ 200 Rs/Day, $w = \frac{750}{6} =$ 125 Rs/Day

Required days $= \frac{26500}{7\times200+125\times10} =$ 10 days Ans

36.

$4m+5w = \frac{8800}{8} = 1100$

7m + 10w = 2050

(8m − 7m) = 2200 − 2050 = 150

$w = \frac{500}{5} = 100$

Required days $= \frac{21600}{1200+1200} =$ 9 days Ans

37.

P → 5day → 5×1

Q → 4day → 4×2

R → 4day → 4×3

S → 2day → 4×2

Total work = 33

$R = \frac{33}{3}$

= 11 days

38.

5M × 8 = 0 × 24

$\frac{M}{0M} = \frac{3}{5}$

Total work = 24×5

= 120 unit

work is completed in $= \frac{24\times5-4\times5\times3}{(5\times3+5)} =$ 3 days

Total = 3+4 = 7days Ans

39.

8500 − 6050 = 2450

Multiple of 2450 from option is 49.

40.

A × 12 × 6 = B × 8 × 7

$\frac{A}{B} = \frac{7}{9}$

Total work = 12×6×7

Required days $= \frac{12\times7\times6}{(7+9)\times9} = \frac{7}{2}$ days Ans

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41.

A — $\frac{1}{4}$ — 9

A — 36 (×7, ×6) 252

B — 42

$\frac{252}{13}$

42.

A × $\frac{2}{5}$ — 12

A — 30

A:B = 4:5 [eff]

A:B = 5:4 [time]

B = $\frac{30}{5}$ × 4 = 24 Day

C = 12 Day (×20)

D = 16 Day (×15, ×8, ×10) 240

A = 30

B = 24

= $\frac{240}{53}$

43.

AB = 18 (×12)

BC = 24 (×9, ×8) 216

AC = 27

A+B+C = $\frac{12+9+8}{2}$ = $\frac{29}{2}$

= $\frac{216 \times 2}{29}$ = $14\frac{26}{29}$

44.

S — 15 (×6, ×5) 90

K — 18

2 Day — 5+6 = 11 work

11 × 8 = 88 work in 16 Day

Left = 90 − 88 = 2

Done by Saral.

$16 + \frac{2}{6}$

= $16\frac{1}{3}$ Day

45.

2K = 3V, 5D = 4K

$\frac{K}{V} = \frac{3}{2}$ $\frac{K}{D} = \frac{5}{4}$

K : V : D = 15 : 10 : 12

$\frac{48 \times 37}{12}$ = 148

46.

Let the Total work = 1

$\left(\frac{1}{120} + \frac{1}{150}\right) \times 20 + \left(\frac{1}{120}\right) \times 12$

$+ \left(\frac{1}{120} + \frac{1}{C}\right) \times 48 = 1$

$= \frac{3}{10} + \frac{1}{10} + \frac{2}{5} + \frac{48}{C} = 1$

$\frac{48}{C} = \frac{1}{5}$

C = 240 Days

47.

A − 50 (×6)

B − 60 (×5) 300

ABC − 20 (×15)

C = 15 − 11 = 4

= $\frac{7500}{15} \times (5-4)$

= 500

48.

A − 18 (×4)

B − 24 (×3) 72

C − 36 (×2)

1st Day = 4+3 = 7

2nd " = 4+2 = 6

1 Day work = 7+6 = 13

7 Day " = 65

11th Day = 65 + 7 = 72

11 Day

49.

$\frac{x}{y+z} = \frac{1}{3} \times \frac{5}{5} = \frac{5}{15}$

$\frac{z}{x+y} = \frac{1}{4} \times \frac{4}{4} = \frac{4}{16}$

x : y : z = 5 : 11 : 4

$x+y = \frac{20 \times 10}{9}$

= $\frac{200}{9}$ = $22\frac{2}{9}$ Day

50.

Total work = 60 × 40 = 2400

Every 10 Day 5 men leave

60 × 10 + 55 × 10 + 50 × 10 + 45 × 10

= 2100

Remining (2400 − 2100) work in 40 Day.

= $\frac{300}{40}$ = 7.5 Day

Total time = 40 + 7.5

= 47.5 Days

51.

$(AB + Am) \times \frac{40}{9} = \left(2AB + \frac{Am}{3}\right) \frac{60}{17}$

$(AB + Am) \times \frac{2}{9} = \left(2AB + \frac{Am}{3}\right) \frac{3}{17}$

34 AB + 34 Am = 54 AB + 9 Am

$\frac{AB}{Am} = \frac{25}{20} = \frac{5}{4}$

Total work = $\frac{9 \times 40}{9}$ = 40

AB = $\frac{40}{5}$ = 8 Days

52.

10 × 40 = 10 × x + 6 (50 − x)

400 = 10x + 300 − 6x

4x = 100

x = 25

53.

40 × 15 = 3 × 40 + 60 × x

60x = 480

x = 8

Total time = 8 + 3

= 11

54.

m = 2 W = 48 = 5 G

m : W : B : G = 20 : 10 : 5 : 4

m × 39 = (m + W + B + G) x

20 × 39 = 39 × x

x = 20

55.

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$\frac{90\times200}{0.5} = \frac{400\times x}{2.5}$

$90\times5 = 2x$

$x = 225$

Extra $= 225-90$

$= 135$

56.

$(12m+12w)\times9 = (6m+15w)\times12$

$36m+36w = 24m+60w$

$12m = 24w$

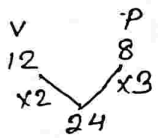
$\frac{m}{w} = \frac{2}{1}$

Total work $= (12\times2+12\times1)9$

$= 36\times9$

$= \frac{36\times9}{9\times2} = 18$ Day

57.



2 week = 5

8 " = 20

9 " = 20+3 = 23

$9w\ \frac{1}{2} = 9.5$ Ans

58.

A - 6 ×5
B = 10 ×3 30

2 hours ⟶ 8

6 " ⟶ 24

7 " ⟶ 24+5 = 29

Remining 1 B Can Do

$7+\frac{1}{3} = 7\frac{1}{3}$ h

59.

$(5m+8w)12 = (3m+7w)15$

$15m = 9w$

$\frac{m}{w} = \frac{3}{5}$

Total work $= (5\times3+8\times5)\times12$

$= 55\times12$

Total time $= \frac{55\times12}{11\times5}$

$= 12$ Days

60.

man = 2x

W = 3x

$\frac{1}{2x}+\frac{1}{3x} = \frac{1}{24}$

$\frac{5}{6x} = \frac{1}{24}$,

$x = 20$

W = 3×20

= 60

61.

$\frac{1}{84}\times\frac{S}{1} = \frac{T\times1}{2}$

S : T

Eff - 4 : 1

together in ⟶ 60 days

Total work : 60×5

$S = \frac{60\times5}{4}$

= 75 Days

62.

maya $\frac{7}{10}$ — 15day

1 — $\frac{150}{7}$ day.

maya + Suresh $\frac{3}{10}$ — 4day

1 — $\frac{40}{3}$ day

63.

$g = 6$ ×4 24
$v = 24$ ×1

Total work $= 24+3\times4$

$= 36$

$t = \frac{36}{5}$

$= 7\frac{1}{5}$

64.

P Q

2 1 Eff

1 2 Time

40 80

$\frac{40\times80}{120} = 26.6$

$= 27$

65.

$\frac{(5w+9G)9}{18720} = \frac{(9w+16G)14}{52080}$

$\rightarrow 3w = 5G$ $9w = 15G$

$12G = 20G$

$\frac{(12w+7G)\times13}{x} = \frac{(9w+16G)14}{52080}$

$= \frac{31G\times14}{52080} = \frac{27G\times13}{x}$

$x = 42120$

66.

A - 32

Ajay did 4 days

$\frac{4}{32} = \frac{1}{8}$

Remaining $= 1-\frac{1}{8} = \frac{7}{8}$

$B = \frac{7}{8}\times\frac{1}{4} = \frac{7}{32}$

$= \frac{32}{7}\times7 = 32$

67.

$R\times\frac{6}{5}\times\frac{7}{5} = 1430$

$R = \frac{1430\times25}{42}$

$R = 851.19$

68.

A - 30 ×20
B - 40 ×15 600
C - 50 ×12

3 days = 47

36 " = 564

38 " = 564+20+15

38 " = 599

$38\ \frac{1}{12}$ Ans

69.

A - 4 unit = 5 day.

B - 5 unit = 6 day

A	Day	5	10	15
	unit	4	8	12

B	Day	6	12	18
	unit	5	10	15

Total work = 30 unit in 18 days.

70.

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PQ — 24 ⟩ 5
QR — 30 ⟩ 4 ⟩ 120
PR — 40 ⟩ 3

$P+Q+R = \frac{12}{2}$
$= 6$

$x \rightarrow$

$P = 2 \xrightarrow{\times 4} 8 - x$
$Q = 3 \xrightarrow{\cdot 5} 1.5 - y$
$R = 1 \xrightarrow{2.5} 2.5 - z$

$\frac{120}{8+1.5+2.5} = 10$ Days

71.

R — 20 ⟩ ×3
S — 15 ⟩ ×4 ⟩ 60
T — 10 ⟩ ×6

2 Day $= 2\times3+6+4$
$= 16$

6 Day $= 48$

$6 + \frac{12}{3+6}$ Remaning

$7 + \frac{3}{7} = \frac{52}{7}$

72.

Let mon $= x$

$13x = x + (x-9) + (x-18) \cdots 16$ days
$13x = 16x - 9(1+2+3 \cdots 15)$
$13x = 16x - \frac{9\times15\times16}{2}$
$3x = 360\times3$
$x = 360$

73.

$A\times\frac{1}{3}$ — 32
A — 96

$B\times37.5$ — 24
B — 64 ⟩ ×15
A — 96 ⟩ ×10 ⟩ 960
C — 80 ⟩ ×12

$(15+12)x + (10+12)(x+8) = 960$
$27x + 22x + 176 = 960$
$x = 16$

$C \rightarrow \frac{12\times16}{960}\times3.5 = \frac{7}{10}$

74.

$10w\times16 = 6m\times8$
$\frac{m}{w} = \frac{10}{3}$

$12m\times2 + (6m+5w)x = 10w\times16$
$240 + 75x = 480$
$75x = 240$
$x = \frac{240}{75}$
$= \frac{16}{5}$

Time $= 2 + \frac{16}{5}$
$= \frac{26}{5}$

75.

x — 5 ⟩ ×6
y — 15 ⟩ ×2 ⟩ 30
z — 30 ⟩ ×1

1st — 6
2nd — 6+2+1 = 9
3rd — 6
4th — 6+2+1 = 9

Total $= 6+9+6+9 = 30$
Day $= 4$

76.

A:B:C = 1:1:1
$\frac{15\times1}{1} = 15$ Day.

77.

Let mon $= x$

$x\times11 = x + x-16 + x-32 \cdots 15$ da
$11x = 15x - (16+32+\cdots 14^{th})$
$11x = 15x - (\frac{14}{2}[32+(14-1)16]$
$11x = 15x - 7\times240$
$4x = 1680$
$x = 420$

78.

m = 3 ⟩ ×5
w — 5 ⟩ ×3 ⟩ 15
B — 15 ⟩ ×1

$(1m + 1w + xB)\frac{\times1}{5} = 15$

$8 + x = 75$
$x = 67$

79.

B — 24 ⟩ ×6
C — 36 ⟩ ×4 ⟩ 144
D — 48 ⟩ ×3

$B - 4\times6 = 24$
$C - 10\times4 = 40$
144

Total $= \frac{208}{13}$
$= 16$

80.

4h — 32] R
1h — 8

6h — 48] A
1h — 8

$16\times1h$ — 16×16
16h — 256 pg.

81.

A+B — 12.5 ×3 ⟩
B+C — 18.75 ×2 ⟩ 37.5
C+A — 15 ×2.5

$A+B+C = \frac{7.5}{2}$

$C = \frac{7.5}{2} - 3$
$C = \frac{1.5}{2}$
$D = \frac{1.5}{2}\times\frac{40}{100}$
$= \frac{3}{10} = 0.3$

$\frac{37.5\times2}{8.1} = \frac{250}{27}$
$= 9\frac{7}{27}$

82.

A = 9 ⟩ ×4
B = 12 ⟩ ×3 ⟩ 36
C = 18 ⟩ ×2

$4\times3 + 3\times3 = \frac{21}{15}$
$C = \frac{15}{2} = 7\frac{1}{2}$

83.

$4x = x-10 + x-20 + \cdots 7^{th}$ day
$3x = 10\times\frac{6\times7}{2}$
$x = 70$

84.

S's Day ×9 = m's 6 day.

$\frac{S}{m} = \frac{2}{3}$
$2\times15 = 3\times D$
$D = 10$

85.

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NO QUESTION.

86.

15 men = 10 mac

$\frac{men}{mac} = \frac{2}{3}$

Total work = 15x16x22

5 men = 5x2x = 10x

4 mac = 4x3x = 12x

Total eff = 22x

Total time = $\frac{15x66x2x}{22x}$

= 90.

87.

140 x 35 = 10x140 + 175xx

$x = \frac{140 \times 25}{175}$

= 20

88.

1 men = 3 x 10 = 30 (x8)

1 women = 48 (x5) 240

1 kid = 60 (x4)

Total eff = 4 x 17 = 68

$\frac{240}{68} = \frac{60}{17}$

89.

A — 200 (x1) 200

B — 100 (x2)

3's day — 1+2+1+2 = 6

99 day — 198

Rem = 2

$99 + \frac{2}{3} = 99\frac{2}{3}$

90.

AB = 25 (x36)

BC = 36 (x25) 900

CA = 30 (x50)

ABCD = 18 x50

2(A+B+C) = 91

A+B+C = 45.5

D = 50 - 45.5 = 4.5

Time = $\frac{900}{4.5}$ = 200

91.

10 x 300 = 250 xD

Rem

D = 12 Days

92.

A+B — 25 (x1) 175

B — 35 (x5)

A : B+5

1 1

7-B = B+5

B = 1

$\frac{175}{1} = 175$

93.

$500 \times \frac{4}{5} \left(\frac{100+b}{100}\right) \times \frac{4}{5} \times \left(\frac{100+b}{100}\right) \times \frac{4}{5} = 1024$

$(100+b)^2 = \frac{1024 \times 100}{64} \times 25$

$100+b = \sqrt{40000}$

$b = 100$

94. The End.

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Pipe & Cistern

MTS 2020

Q1. A tank is to be filled completely with water for which 8 pipes of the same kind are used. The tank gets filled in 1 hour and 40 minutes. If 10 pipes of the same kind, as mentioned above, are used in how much time (in hours and minutes) will the tank be completely filled?

(a) 1 hour 30 minutes
(b) 1 hour 45 minutes
(c) 1 hour 5 minutes
(d) 1 hour 20 minutes

SSC CGL MAINS 2020

Q2. Two pipes A and B can fill a cistern in $12\frac{1}{2}$ hours and 25 hours, respectively. The pipes were opened simultaneously, and it was found that, due to leakage in the bottom, it took one hour 40 minutes more to fill the cistern. If the cistern is full, in how much time (in hours) will the leak alone empty 70% of the cirtern?

(a) 35 (b) 50 (c) 40 (d) 30

CGL MAINS 2022

Q3 There are three taps of diameter 2 cm, 3 cm and 4 cm, respectively. The ratio of the water flowing through them is equal to the ratio of the square of their diameters. The biggest tap can fill an empty tank alone in 81 min. If all the taps are opened simultaneously, then how long will the tank take (in min) to be filled?

a) $34\frac{20}{29}$ b) $64\frac{20}{29}$ c) $54\frac{20}{29}$ d) $44\frac{20}{29}$

Q4 There are two inlets A and B connected to a tank. A and B can fill the tank in 32 h and 28 h, respectively. If both the pipes are opened alternately for 1 h, starting with A, then in how much time (in hours, to nearest integer) will the tank be filled?

a) 22 b) 30 c) 36 d) 24

CHSL PRE 2022

Q5 P can fill a tank in 5 hours. Q can fill the same tank in 10 hours. R can empty the same tank in 20 hours. How much time will all the three take together to fill the same tank ?

a) 6 hr b) 4 hr c) 10 hr d) 5 hr

CGL PRE 2023

Q6 Pipe A and pipe B running together can fill a cistern in 6 minutes. If B takes 5 minutes more than A to fill it, then the time in which A and B will fill that cistern separately will be, respectively, _____.

1. 15 min and 10 min
2. 15 min and 20 min
3. 25 min and 20 min
4. 10 min and 15 min

Q7 Each inlet pipe can fill an empty cistern in 84 hours while each drain pipe can empty the same cistern from a filled condition in 105 hours. When the cistern is empty, 9 inlet pipes and 10 outlet pipes are simultaneously opened. After how many hours will the cistern be completely filled?

1. 84 2. 88 3. 80 4. 90

CGL 2024

Q8. An inlet pipe can fill a water storage tank in 11 hours and an outlet pipe can empty the completely filled tank in 15 hours. If both pipes opened simultaneously. The time taken to fill the empty tank (in hours) is:

a) $45\frac{1}{2}$ b) $41\frac{1}{4}$ c) $49\frac{3}{4}$ d) 40

Q9. There are two pipes to fill a tank. Together, they can fill the tank in 15 minutes. If one pipe can fill the tank in one and a half times as fast as the other, the faster pipe alone can fill the tank in:

a) 25 min b) $32\frac{1}{2}$ min
c) 20 min d) 10 minutes

Q10. A tank can be filled by pipe A in 4 hours and pipe B in 6 hours. At 8:00 a.m., pipe A was opened. At what time will the tank be filled if pipe B is opened at 9:00 a.m.?

a) 10 : 16 a.m. b) 10 : 22 a.m.
c) 10 : 48 a.m. d) 10 : 18 a.m.

Q11. Three pipes, P, Q and R, together take four hours to fill a tank. All the three pipes were opened at the same time. After three hours, P was closed, and Q and R filled the remaining tank in two hours. How many hours will P alone take to fill the tank ?

a) 8 b) 10 c) 12 d) 9

Q12. A cistern can be filled by two pipes in 8 minutes and 10 minutes, separately. Both the pipes are opened together for a certain time, but due to an obstruction, only 5/8 of the full quantity of water flowed through the former pipe and 3/5 through the latter pipe. However, the obstruction was suddenly removed, and the cistern was filled in 3 minutes from that moment. How long did it take before the full flow began?

a) $2\frac{6}{17}$ min b) $9\frac{6}{7}$ min
c) $3\frac{1}{16}$ min d) $2\frac{30}{37}$ min

Q13. Pipe A takes 4/5 of the time required by pipe B to fill an empty tank individually. When an outlet pipe C is also opened simultaneously with pipes A and B, it takes 4/5 more time to fill the empty tank than it takes when only pipe A and pipe B are opened together. If it takes 40 hours to fill the tank when all the three pipes are opened simultaneously, in what time (in hours) will pipe C empty the full tank, operating alone?

a) 65 b) 45 c) 50 d) 75

ANSWERS

1	D	2	A	3	D
4	B	5	B	6	D
7	A	8	B	9	A
10	C	11	A	12	A
13	C				

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1.

8P x 100 min = 10P x x
x = 80 min
= 1h 20 min

2.

A — 25/2 ×2
B — 25 ×1 → 25
Total time = 25/5 h
= 25/5 x 60
= 8h 20 min

Que fo leak
8h 20 min + 1h 40 min
= 10h ×25
AB = 25/5 h 30 → 250
= 250/30-25 = 50h
= 50h x 70/100
= 35h

Water flowing ∝ D²
Total work = 81 x 4²
= 1296
time = 1296/4²+3²+2² = 1296/29
= 44 20/29

— 32 ×7
— 28 ×8 → 224

2h — 15 x 15
×15
30h — 225 x
= 30h

— 5 ×4
— 10 ×2
— 20 ×1 → 20
= 20/5 = 4h

A+B — 6
A = B+5
by option
A = 10 ×3
B = 15 ×2 → 30 30/5 = 6h

7.

I — 84 ×5
Q — 105 ×4 → 420
9x5 - 10x4 = 5
420/5 = 84

8.

I — 11 ×5
O — 15 ×11 → 165
1h — 15-11 = 4
40h — 160
41h — 164
(41 1/4) — 165

9.

A+B = 15
A : B = 3 : 2
Total work = 15x5 = 75
A = 75/3 = 25

10.

A — 4x3
B — 6x2 → 12
A's 1h — 3
Remaining = 12-3 = 9
9/5 = 1h 48 min
10 : 48 am

11.

P+Q+R = 4 x 5 Total Work = 20
3h work (P+Q+R) = 5x3
= 15
Rem = 20-15 = 5
(Q+R) in 2h = 5 work
eff = 2.5
P eff = 5 - 2.5 = 2.5
Time = 20/2.5 = 8h

12.

8 ×5 40
10 ×4
last 3 min = 9x3 = 27
Initial = 13
[5 x 5/8 + 4 x 3/5] T = 13
T = 520/221 = 2 6/17

13.

A : B
4 : 5 time
5 : 4 eff
(e) total work = 20 unit
Time A+B = 20/9 unit
Time A+B+C = 20/9 x 9/5 = 4 unit
4 unit — 40
1 unit — 10
Time A+B = 200/9 h

A+B+C — 4
A+B — 20/9
×5 ×9 → 20
C = -4

Total work = 200/4 = 50

14. THE END.

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Ratio & Proportion

CHSL 2018

Q1. A sum of Rs. 4360 was to be divided among A, B, C and D in the ratio of 3 : 4 : 5 : 8, but it was divided in the ratio of $\frac{1}{3}:\frac{1}{4}:\frac{1}{5}:\frac{1}{8}$ by mistake, which of the following statement is true?
(a) A received Rs. 956 (b) B received Rs. 318 less
(c) D received Rs. 1144 more (d) C received Rs. 130 less

Q2. In an examination, the success to failure ratio was 5 : 2. If the number of failures been 14 more, then the success to failure ratio would have been 9 : 5. The total number of candidates who appeared for the examination was :
(a) 210 (b) 196 (c)126 (d) 201

Q3. Rs. 8000 is distributed among A, B and C such that they receive notes of Rs. 500, Rs. 200 and Rs. 100 respectively. The amounts received by them are in the ratio 15:2:3. What was the ratio of the numbers of notes of Rs. 500, Rs 200 and Rs 100?
(a)3:1:3 (b) 4:1:2 (c)3:3:1 (d) 3:2:2

CPO 2018

Q4. Three partners A, B and C share profit and losses in the ratio 3 : 4 : 7. If the profit for the year before charging 30% tax is Rs. 1,10,166. What is B's share of profit after tax?
(a)₹9442.80 (b)₹31476 (c)₹22033.20 (d)₹24673.10

Q5. A, B and C are partners in a firm sharing profit in the ratio of 3:4:5. If they set aside 4% of the profits as emergency fund and shared the rest of the profit and B gets his share of profit as Rs. 1,81,400, the amount of profit set aside for emergency fund is:
(a)Rs.27848 (b)Rs.18140 (c)Rs.22675 (d)Rs.24500

Q6. A, B and C started a business by investing Rs. 55,000, Rs. 65,000 and Rs. 75,000 respectively. A is a working partner and gets 20% of the profit as a working allowance and remaining is distributed in the proportion of their investment. If the money received by C is Rs. 27,000 what is total profit?
(a) Rs. 85500 (b) Rs.87750 (c)Rs.76850 (d) Rs.70200

CGL MAINS 2018

Q7. The ratio of the income of A to that of B is 5:7 A and B save Rs 4000 and Rs. 5000 respectively. If the expenditure of A is equal to $66\frac{2}{3}$ % of the expenditure of B, then the total income of A and B is:
(a) Rs.25,200 (b) RS. 24,000 (c) Rs. 26,400 (d) Rs.28,800

Q8. A, B and C invested their capitals in the ratio of 2:3:5. The ratio of months for which A, B and C invested is 4:2:3 If C gets a share of profit which is Rs. 1,47,000 more than that of A, then B's share of profit is:
(a) Rs. 1,26,000 (b) Rs. 1,68,000
(c) Rs. 1,05.000 (d) Rs. 1,89,000

Q9. The ratio of income of A and B last year was 4:3, respectively. The ratios of their individual incomes of the last year and the present year are 3:4 and 5:6, respectively. If their total income for the present year is Rs. 8.04 lakh, then the income of B last year was:
(a) Rs.2.7 lakh (b) Rs.3.6 lakh
(c) Rs. 2.4 lakh (d) Rs. 2.8 lakh

Q10. A, B and C started a business with their capitals in the ratio 2:3:5. A increased his capital by 50% after 4 months, B increased his capital by $33\frac{1}{3}$% after 6 months and C withdrew 50% of his capital after 8 months, from the start of the business. If the total profit at the end of a year was Rs. 86,800, then the difference between the shares of A and C in the profit was:
(a) Rs. 12,600 (b) Rs. 7,000 (c) Rs. 9,800 (d) Rs. 8,400

Q11. A started a business with a capital of ₹54000 and admitted B and C after 4 months and 6 months respectively. At the end of the year, the profit was divided in the ratio 1 : 4 : 5. What is the difference between the capital invested by B and C?

(a)₹1,08,000 (b)₹1,62,000 (c)₹2,16,000 (d)₹3,24,000

CGL PRE 2018

Q12. When x is subtracted from each of 21. 22, 60 and 64, the numbers so obtained, in this order, are in proportion. What is the mean proportional between (x + 1) and (7x + 8).
(a) 27 (b)18 (c)24 (d)21

Q13. Eight years ago, the ratio of ages of A and B was 9:10. The ratio of their ages four years from now will be 12: 13. What is the age (In years) of C now, if his age is 6 years more than that of A?
(a) 56 (b)42 (c)50 (d) 48

Q14. In one bag 50 paisa, 25 paisa and 1 rupee coins are in the ratio of 5: 8: 1. If the total cost of all the coins is 55 rupees then how many coins of 25 paisa are in the bag?
(a)25 (b)10 (c)50 (d)80

MTS 2019

Q15. If the ratio of selected to unselected candidates was 14:25. If 35 less had applied and 10 less selected, the ratio of selected to unselected would have been 3. 5. What is the Number of candidates who have applied for a job?
(a) 200 (b) 175 (c) 275 (d) 195

Q16. Seventy eight is divided into two parts such that the ratio between four times the first part and five times the second part is 14:15. The first part is :
(a)42 (b)36 (c)30 (d)48

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Q17. The difference between the cubes of two numbers is 999. The numbers are in the ratio of 4:3. What is the square of the smaller number?
(a) 49 (b)81 (c) 64 (d) 100

Q18. The ratio between the divisor and remainder is 3 : 2 and the ratio between the divisor and the quotient in 7 : 12. If remainder is 14, then find the remainder when the dividend is divided by 9.
(a) 3 (b)6 (c)4 (d) 5

Q19. The ratio of incomes of A and B is 3:8 and the ratio of their savings is 9:25. If the income of A equals the expenditure of B. then the ratio of expenditures of A and B is:
(a) 3:8 (b) 6:17 (c)5:12 (d) 2:5

CPO 2019

Q.20 A invests Rs. 600000 more than B in a business. B invest his capital for $7\frac{1}{2}$ months, while A invests his capital for 10 months. Out of the total profit which is Rs. 12,40,000, if the share of B is Rs. 248000 less than the share of A, then the capital of B is:
(a) Rs. 4500000 (b)Rs. 4200000
(c) Rs. 4000000 (d) Rs. 4800000

Q21. A started a business with a capital of ₹1,12,000. After 2 months, B joined the business with a capital ₹ 80,000, and after another 2 months, C joined the business with a capital of 72,000. After 10 months from the start of the business, B withdrew ₹ 8,000 and C also withdrew 8,000. If B received ₹ 9,800 as his share in the profit at the end of a year, then the total profit was:
(a) ₹30,800 (b) ₹35,800 (c)₹32,400 (d)₹33,600

Q.22 A, B and C are partners in business. A, whose capital has been used for 5 months, claims 1/7 of the profit. B whose capital has been used for 7 months claims $\frac{1}{5}$ of the profit. C has invested Rs. 4600 for 9 months. How much capital did A contribute?
(a)1800 (b)1650 (c)1600 (d)1850

CGL PRE 2019

Q23. If x is the mean proportional between 12.8 and 64.8 and y is the third proportional to 38.4 and 57.6, then 2x : y is equal to:
(a)2:3 (b)4:5 (c) 3:4 (d) 12

Q24. If 2x+1, x+2, 2 and 5 are in proportion, then what is the mean proportional between 3.5(1-x) and 8(1+x)?
(a)5.5 (b)4.25 (c)5.25 (d)4.5

CGL MAINS 2019

Q25. X and Y enter into a partnership with capital in ratio 3 : 5. After 5 months X adds 50% of his capital, while Y withdraws 60% of his capital. What is the share (in ₹ lakhs) of X in the annual profit of ₹6.84 lakhs?
(a) 3.72 (b)4.2 (c)3.6 (d) 3.12

Q26. The monthly incomes of A and B are in ratio 3 : 5 and the ratio of their savings is 2:3. If the income of B is equal to three times the saving of A, then what is the ratio of the expenditure of A and B?
(a)5:8 (b)8:15 (c)7:11 (d)3:7

Q27. A person divided a certain sum between his three sons in the ratio 3: 4: 5. Had he divided the sum in the ratio $\frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ the son, who got the least Share earlier, would have got ₹1,188 more. The sum (in ₹) was:
(a) 6,840 (b) 7,008 (c) 6,768 (d) 5,640

Q28. A and B enter into a partnership with capital in the ratio 5 : 6. After 4 months, A withdraws $\frac{1}{5}$ of his capital, while B increases his capital by $33\frac{1}{3}$%. What is the share (in ₹ lakhs) of B in the annual profit of ₹6.3 lakhs?
(a) 2.34 (b) 2.61 (c) 3.69 (d) 3.96

CPO 2020

Q29. In a school, $\frac{5}{12}$ of the number of Students are girls and the rest are boys, $\frac{4}{7}$ of the number of boys are below 14 years of age, and $\frac{2}{5}$ of the number of girls are 14 years or above 14 years of age. If the number of students below 14 years of age is 1120, then the total number in the school is:
(a) 1820 (b) 1900 (c)1920 (d) 1290

CGL PRE 2020

Q30. When x is subtracted from each of 19, 28, 55 and 91, the numbers so obtained in this order are in proportion. What is the mean proportional between (x+9) and x^2?
(a)27 (b)32 (c)24 (d)28

Q31 Atul purchased Bread costing ₹20 and gave a 100 rupee note to the shopkeeper. The shopkeeper gave the balance money in coins of denomination ₹2, ₹5 and ₹10. If these coins are in the ratio 5 : 4 : 1, then how many ₹5 coins did the shopkeeper give?
(a)5 (b)6 (c)8 (d)4

Q32 What is the ratio of the average of first eight prime numbers to the average of first ten even natural numbers?
(a) 1 : 7 (b) 7 : 80 (c) 8 : 70 (d)7 : 8

Q33 Forth proportion to 12, 18, and 6 is same as the third proportion to k and 6. What is the value of k?
(a)3√6 (b)13.5 (c)4 (d)3

Q34 If x is subtracted from each of 24, 40, 33 and 57, the numbers, so obtained are in propotion. The ratio of (5x + 12) to (4x + 15) is:
(a)4 : 3 (b)14 : 13 (c)7 : 4 (d)7 : 5

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Q35. The ratio of present ages of A and B is 5:3. 9 years ago, the ratio of their ages was 23: 12. What will be the ratio of their ages after 15 years?
(a) 35:24 (b)7:5 (c) 34:25 (d) 3:2

Q36 If p is the third proportional to 3, 9, then what is the fourth proportional to 6, p, 4?
(a) $\frac{3}{2}$ (b)$2\sqrt{3}$ (c)10 (d)18

Q37 Monthly salaries of Anil and Kumud are in the ratio 19 : 17. If Anil and Kumud get salary hike of ₹2000 and ₹1000 respectively, then the ratio in their salaries becomes 8 : 7. What is the present salary of Kumud (in ₹)?
(a)18000 (b)38000 (c)34000 (d)35000

Q38 What is the ratio of the mean proportional between 1.2 and 10.8 to the third proportional to 0.2 and 1.2?
(a) 1: 3 (b)1 : 2 (c)2 : 1 (d)3 : 1

Q39 The daily wages of P, Q and R are in the proportion 5 : 7 : 8. If Q earns ₹560 per day, then what are the daily wages (in ₹) of R and P, respectively?
(a) 400 and 640 (b) 350 and 590
(c) 640 and 400 (d) 590 and 350

SSC SELECTION PHASE IX

Q40 A sum of Rs6,300 is divided among A, B, C and D such that the ratio of the combined share of A and D to the combined share of B and C is 11 : 10 and the ratio of the shares of B and D is 8 : 9. If C receives Rs1,560, then what is the difference (in Rs) between the shares of A and B?
(a) 160 (b) 120 (c) 180 (d) 240

Q41. The monthly incomes of A and B are in the ratio 5 : 8. A saves Rs7,400 and B saves Rs6,500 per month. If the ratio of the monthly expenditure of A and B is 1 : 2, then the monthly income (in Rs) of B is:
(a) Rs43,500 (b) Rs39,200 (c) Rs33,200 (d) Rs34,100

Q42 The ratio of the ages of A and B , 8 years ago, was 5 : 7. The ratio of their ages, 8 years from now, will be 9 : 11. If the present age of C is 13 years less than that of B, and the present age of D is 8 years less than of the age of A, then the sum of the present ages of C and D, in years, is:
(a) 55 (b) 47 (c) 53 (d) 43

SSC CGL PRE 2021

Q43. A, B and C divide an amount of Rs10,500 amongst themselves in the ratio 5 : 7 : 9, respectively. If each one gets Rs500 more, then what will be the ratio of the amounts with A, B and C?
a) 3 : 4 : 5 b) 5 : 7 : 9
c) 5 : 6 : 7 d) 7 : 9 : 11

SSC MTS 2020

Q44. A sum (in Rs) is distributed between A, B and C in the ratio 5:6:7. If B given Rs 400 from his share to C, the ratio of the shares of A,B and C becomes 2:3:4. What is the sum of the sgares (in Rs) of A and C, in the beginning?
(a) 7,200 (b) 14,000 (c) 8,400 (d) 11,200

Q45. In an election, the votes cast for two candidates were in the ratio 4:9. If the successful candidate received 984321 votes, then the total votes polled were:
(a) 1912577 (b) 1712597
(c) 1571279 (d) 1421797

Q46. A sum (in Rs) is distributed between A, B and C in the ratio 5:6:7. If B gives Rs 400 from his share to C, the ratio of the share of A,B and C becomes 2:3:4. What is the sum of the share (in Rs) of A and C,in the beginning?
(a) 14,000 (b) 7,200 (c) 8,400 (d) 11,200

Q47. A man ordered 10 physics books and some chemistry books. The price of a chemistry book is twice the price of a Phisics book. While preparing the bill, the clerk interchanged the number of physics and chemistry books by mistake, which decreased the bill by 12-1/2% the ratio of the number of physics books to the number of chemistry books in the original order is:
(a) 3:4 (b) 2:3 (c) 4:5 (d) 3:5

Q48. In an examination, the ratio of the number of candidates who passed to those who failed was 5:2. If the number of failed candidates had been 14 more, then the ratio of the number of passed candidates to those who failed would have been 4:3 .The number of candidates who appeared in the examination was;
(a) 126 (b) 98 (c) 70 (d) 100

Q49. 70 males and 100 females are working in a firm. During one mass recruitment drive, an equal number of males and females are recruited and their ratio become 3:4 .The total number of people working in the firm after recruitment is:
(a) 210 (b) 220 (c) 200 (d) 240

SSC CGL MAINS 2020

Q50. The ratio of the incomes of A and B in the last year was 4:3. The ratios of their individual incomes in the last year and the present year are 3:4 and 5:6, respectively. If their total income in the present year is Rs 24.12 lakhs, then the sum of the income (in lakhs) of A in the last year and that of B in the present year is:
(a) 10.98 (b) 21.28 (c) 20.52 (d) 22.17

Q51. A sum of 46,800 is divided among A, B, C and D in such a way that the ratio of the combined share of A and D to combined share of B and C is 8 : 5.The ratio of the share of B to that of C is 5 : 4, A receives Rs 18,400. If x is the different between the share of A and B and y is the difference between the share of C and D, then what is the value of (x-y) (in Rs)?
(a) 7000 (b) 6500 (c) 5000 (d) 6000

Q52. The ratio of the incomes of A and B in 2020 was 5 : 4.The ratios of their individual incomes in 2020 and 2021 were 4 : 5

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and 2:3, respectively. If the total income of A and B in 2021 was Rs.705, 600, then what was the income (in Rs.) of B in 2021?
(a) 3,45,600 (b) 2,79,700 (c) 3,60,000 (d) 4,25,900

MAINS 21

Q53. Salaries of B, C , D and E are in the ratio of 2 : 3 : 4 : 5 respectively. Their salaries are increased by 20 percent, 30 percent, 40 percent and 50 percent respectively. If the increased salary of D is ₹560, then what is the sum of the original salaries of B, C, D and E?
a) Rs1400 b) Rs1260 c) Rs1560 d) Rs1820

DP 2022

Q54. Kishore had a precious ruby worth Rs63,888 with him. While showing it to one of his friends it fell down and broke into 4 pieces, the weights of which are proportional to 1 : 2 : 3 : 5. The value of each of the pieces is directly proportional to cube of its weight. What is the loss that Kishore is going to face, as the stone fell down and broke into pieces?
a) Rs45, 280 b) Rs48,562 c) Rs56,160 d) Rs50,000

Q55. X and Y have their monthly incomes in the ratio 9 : 7 while their monthly expenditures are in the ratio 5 : 3. If they have saved Rs16,000 and Rs14,000 monthly, respectively, then the difference in their monthly incomes is:
a) Rs5500 b) Rs7500 c) Rs8000 d) Rs6000

Q56. If two extreme terms of three continued proportional numbers be ab/c, ac/b, then the mean proportional is:
a) ac b) b c) ab d) a

CGL MAINS 2022

Q57 The ratio of the incomes of two employees is 7 : 4, and the ratio of their expenditures is 3 : 1. If each of them manages to save Rs 4,800 per month, find the sum of their monthly incomes (in Rs).
a) 21120 b) 20120 c) 21150 d) 18150

CHSL PRE 2022

Q58 The ratio of income of Jitendra, and Narendra is 4 : 7 and the ratio of their expenditure is 6 : 5 respectively. If Jitendra saves Rs 400 out of Rs 2800 income, then find the savings of Narendra.
a) Rs 2900 b) Rs 2000 c) Rs 3900 d) Rs 4900

Q59. The ratio of incomes of C and D is 3 : 4 respectively. The sum of their expenditure is Rs 12000. Savings of C is same as that of the expenditure of D. what is the sum of their savings?
a) Rs 25000 b) Rs 15000 c) Rs 20000 d) Rs 16000

Q60. Rs 43.120 is divided among P, Q and R such that P's share is 4/7 of total share of Q and R together and Q's share is 2/5 of total share of P and R together. What is the share of R ?
a) Rs 15120 b) Rs 14220 c) Rs 16400 d) Rs 18050

Q61. There are 5 numbers, where first number is double of second number and two-third of third number. The average of 5 numbers is 60. If the sum of remaining two numbers is 120, then find the value of the 3rd number.
a) 80 b) 60 c) 90 d) 120

Q62. The income of A and B are in the ratio 4 : 5 and their expenditure are in the ratio 5 : 4. If A saves Rs 6000 and B saves Rs 12000, then what will be the income of A?
a) Rs 20000 b) Rs 18000 c) Rs 12000 d) Rs 16000

Q63. P's income is 250 percent of Q's income and P's expenditure is 180 percent of Q's expenditure. If P's income is 400 percent of Q's expenditure, then what is the respective ratio of P's savings and Q's savings?
a) 11 : 3 b) 5 : 2 c) 8 : 3 d) 11 : 5

ICAR & Selection Phase XI

Q64. The annual incomes of Anand and Bharath are in the ratio 3 : 5 and their annual expenses are in the ratio 1 : 3. If each of them saves Rs 10,000 at the end of the year, then the annual income of Bharath is:
1. Rs 25,000 2. Rs 12,000 3. Rs 30,000 4. Rs 15,000

Q65. In an examination, the ratio of the practical to theory marks is 3 : 7. If 80% marks are scored in the practical and 60% of marks are scored in the theory, what is the ratio of marks scored in the theory and the practical?
1. 5 : 7 2. 6 : 7 3. 7 : 4 4. 3 : 7

Q66. A State's own revenue is 1,20,000 crore and Central share is 80,000 crore. If the total expenditure of the State is 2,50,000 crore, what's the proportion of other resources required to meet the expenditure and what's the ratio of all three types of resources?
1. 30% and 4 : 3 : 3 2. 20% and 4.8 : 3.2 : 2
3. 25% and 5 : 2.5 : 2.5 4. 25% and 5 : 3 : 2

Q67. Out of the total income, a family saves 15% and the rest of the amount is spent on three types of expenditure – health, education and food in the ratio of 1 : 2 : 2. The income is Rs 300 less than thrice the expenditure incurred on education. What is the difference between the savings and the expenditure incurred on health?
1. Rs 500 2. Rs 2,250 3. Rs 350 4. Rs 300

CGL PRE 23

Q68 . If a : b : : b : c, and b = 96, then which of the following can be a possible pair of value of a and c?
1. a = 24 ; c = 374 2. a = 32 ; c = 288
3. a = 48 ; c = 168 4. a = 16 ; c = 586

SELECTION PHASE XII

Q69. A sum of money was divided between Cyrus, Rohan and Mishti. The ratio of the sums received by Cyrus and Rohan was 3 : 2, while the ratio of the sums received by Rohan and Mishti was 7 : 12. If the sum received by Cyrus was ₹1,800 less than the sum received by Mishti, how many rupees did Rohan receive as his share?
a) ₹7,560 b) ₹9,240 c) ₹6,300 d) ₹8,400

Q70. Four distinct positive numbers, 'a', 'b', 'c' and 'd', in the order given, are in proportion. 'b' is 35 more than 'a' and 'd' is 60 more than 'c'. The product of 'a' and 'c' is 5376. What is the sum of 'a', 'b', 'c' and 'd'?

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a) 400 b) 398 c) 397 d) 399

Q71. In an examination, there were two papers, A and B, and the maximum mark in each of the two papers was 10. However, the weights assigned to papers A and B were in the ratio 2 : 1, respectively. Jonathan scored 8 out of 10 in Paper A and an overall 70% in the examination. How much did he score in Paper B out of 10?
a) 5.5 b) 6.5 c) 5 d) 6

Q72. A packet has to consist of three types of jellies – orange, mango and strawberry. The price per unit of orange, mango and strawberry jelly is ₹2.00, ₹3.00 and ₹3.50, respectively. In a packet, there are 80 orange jellies, 50 mango jellies and 120 strawberry jellies. What is the average cost (in ₹) of a jelly in a mixed packet?
a) 2.92 b) 3.02 c) 2.80 d) 2.96

Q73. The ratio of the salaries of S to F is 2 : 3 and the ratio of their savings is 3 : 4. What is the ratio of their expenditures if their total savings are equal to the salary of S?
a) 7 : 15 b) 8 : 13 c) 8 : 15 d) 7 : 12

CPO 2024

Q74. If four distinct positive numbers, a, b, c and d, in the order given are in proportion, then which of the following options is NOT correct?
a) b, a, d and c, in the order given are in proportion.
b) c, d, b and a, in the order given are in proportion.
c) d, c, b and a, in the order given are in proportion.
d) a, c, b and d, in the order given are in proportion

CGL 2024

Q75. The cost of a diamond varies directly as the square of its weight. Once, this diamond broke into four pieces with weights in the ratio of 4 : 3 : 2 : 1. When the pieces were sold, the merchant got Rs 63,000 less than that of one piece. Find the original price of the diamond.
a) 86,000 b) 80,000 c) 90,000 d) 75,000

Q76. Q129. The monthly incomes of A, B and C are in the ratio 2 : 9 : 3 and their expenses are in the ratio 3 : 9 : 5. If A's saving is half of his total income, then savings of A, B and C are, respectively, in the ratio of:
a) 3 : 18 : 4 b) 3 : 9 : 2 c) 1 : 2 : 1 d) 2 : 5 : 2

Q77. In a collection of rare coins, there is one gold coin for every for every four non-gold conis. If 20 more gold coins are added to the collection, the ratio of the number of gold coins to that of non-gold coins will be 2 : 3. The total number of coins in the collection will now become _____.
a) 60 b) 100 c) 48 d) 80

ANSWERS

1	D	2	B	3	A
4	C	5	C	6	B
7	B	8	A	9	A
10	A	11	C	12	C
13	C	14	D	15	D
16	A	17	B	18	D
19	D	20	D	21	D
22	A	23	A	24	C
25	A	26	B	27	C
28	D	29	C	30	D
31	C	32	D	33	C
34	B	35	A	36	D
37	C	38	B	39	C
40	D	41	C	42	D
43	A	44	D	45	D
46	D	47	B	48	B
49	A	50	C	51	D
52	A	53	A	54	C
55	A	56	D	57	A
58	A	59	D	60	A
61	C	62	D	63	A
64	A	65	C	66	B
67	D	68	B	69	D
70	D	71	C	72	A
73	B	74	A	75	C
76	A	77	D		

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Ratio & Proportion

1.

Share of A, B, C and D according to old ratio

A	B	C	D
$\frac{3}{20}\times 4360$	$\frac{4}{20}\times 4360$	$\frac{5}{20}\times 4360$	$\frac{8}{20}\times 4360$
↓	↓	↓	↓
218	872	1090	1744

New Ratio of A, B, C, and D

$\frac{1}{3}:\frac{1}{4}:\frac{1}{5}:\frac{1}{8} \rightarrow 40:30:24:15$

Share of A B C D as per new ratio

A	B	C	D
$\frac{40}{109}\times 4360$	$\frac{30}{109}\times 4360$	$\frac{24}{109}\times 4360$	$\frac{15}{109}\times 4360$
↓	↓	↓	↓
1600	1200	960	600

	New − Old	
A	1600 − 218 =	1382 more
B	1200 − 872 =	328 more
C	960 − 1090 =	−130 less
D	600 − 1744 =	−1144 less

C received 130 less.

2.

Success + Failure = Total

5 : 2 = 7

9 : 5 = 14

Total	:	Failure
$7_{\times 2}$	:	$2_{\times 2}$
14	:	4
14	:	5) 1 → 14

Total $14\times 14 = 196$

3.

Total amount received by A, B and C

A	B	C
$\frac{15}{20}\times 8000$	$\frac{2}{20}\times 8000$	$\frac{3}{20}\times 8000$
↓	↓	↓
6000	800	1200

No. of notes

$\frac{6000}{500} : \frac{800}{200} : \frac{1200}{100}$

3 : 1 : 3

Shortcut

Ratio of number of notes = $\frac{\text{Ratio of amount}}{\text{Ratio of denomination}}$

$\frac{15}{500} : \frac{2}{200} : \frac{3}{100}$

= 3 : 1 : 3

4.

Profit to be distributed = (100 − 30)% of total profit

= 70% of 110166

B's share of profit

$= \frac{4}{14}\times\frac{70}{100}\times 110166$

= 22033.20

5. Total Profit = x

Profit to be distributed = (100 − 4)% x = 96% of x

Now $\frac{4}{12}\times\frac{96}{100}\times x = 181400$

$x = 566875$

Emergency fund = 4% of x

$= \frac{4}{100}\times 5668.75$

= 22675

6.

Profit to be distributed = (100 − 20) = 80% of x

55000 : 65000 : 75000

11 : 13 : 15

C's share = $\frac{15}{39}\times\frac{80}{100}\times x = 27000$

$x = 87750$

7.

	A		B
Income	5	:	7
Expend:	2	:	3
	4000		5000

Using cross product method

$x = \frac{4000\times 3 - 5000\times 2}{5\times 3 - 7\times 2} = 2000$

Total income = (7 + 5)x = 12x

= 12 × 2000

= 24000 Ans

8.

A	B	C
2	3	5
×	×	×
4	2	3
8	6	15

↓

7 → 147000

1 → 21000

6 → 126000

9.

4 : 3

3 : 4 and 5 : 6

LCM of 3 & 5 = 15

Ratio of last yr income of A & B = 4 : 3 × 15 = 60 : 45

	A		B
Last Yr	60	:	45
Presnt Yr	$60\times\frac{4}{3}$		$45\times\frac{6}{5}$
	= 80	:	54

80 + 54 = 134 → 8.04

1 → 0.06

45 → 45 × 0.06

= 2.7 lakhs

10.

A	:	B	:	C
4 × 2		6 × 3		8 × 5
+		+		+
8 × 3		6 × 4		4 × 2.5
32	:	42	:	50

OR 16 : 21 : 25

A : B : C

16 : 21 : 25

16 + 21 + 25 = 62 → 86800

1 → 1400

A − C = 25 − 16 = 9

1400 × 9 = 12600 Ans

11.

Time Ratio of A, B & C

= 12 : (12 − 4) : (12 − 6)

= 12 : 8 : 6 or 6 : 4 : 3

Ratio of Investment = $\frac{\text{Profit Ratio}}{\text{Time Ratio}}$

A	:	B	:	C
$\frac{1}{6}$		$\frac{4}{4}$		$\frac{5}{3}$

= 1 : 6 : 10

C − B = 10 − 6 = 4

1 → 54,000

4 → 54000 × 4

= 216000 Ans

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12.

21 — 22 : 60 — 64

1 : 4

$x = \frac{4\times21 - 60\times1}{4-1}$

$= \frac{84-60}{3} = \frac{24}{3} = 8$

Mean Proportion $= \sqrt{(x+1)(7x+8)}$

$= \sqrt{9\times64} = 24$

13.

A	B
9	10
12	13

3 → 8+4=12

1 → 4

A's age 8 years ago = 9x

$= 9\times4 = 36$

A's present age = 36+8

= 44

C's age = 44+6

= 50 Ans

14.

Ratio of denomination $= \frac{1}{2} : \frac{1}{4} : 1$

$= 2 : 1 : 4$

Denomination = 2 : 1 : 4

Ratio of coins = 5 : 8 : 1

Ratio of amount 10 : 8 : 4

10+8+4 = 22 → 55

1 → 5/2

8 → $\frac{5}{2}\times8$

= 40

No. of 25 paisa coins

$= \frac{40}{0.25} = 80$ coins Ans

15.

Selected + Unselected = Applied

14 : 25 = 39

3 : 5 = 8

Applied	:	Selected
39	:	14
8/35	:	3/10

Using Cross-product Method

$x = \frac{-10\times8 - (-35\times3)}{39\times3 - 14\times8} = \frac{25}{5} = 5$

Total applicants = 39x

= 39×5

= 195 Ans

16.

$\frac{4x}{5y} = \frac{14}{15} \Rightarrow \frac{x}{y} = \frac{7}{6}$

7+6 = 13 → 78

1 → 6

7 → 7×6 = 42

17.

$(4x)^3 - (3x)^3 = 999$

$37x^3 = 999$

$x^3 = 27,\ x = 3$

Smaller number = 3x = 3×3

= 9

$9^2 = 81$ Ans

18.

Remainder	:	Divisor	:	Quotient
2	:	3	:	3
7/14	:	7/21	:	12/36

Now 14 → 14

Thus 21 → 21

8 36 → 36

Dividend = Divisor × Quot + Remain

Divi = 21×36+14

$\frac{\text{Dividend}}{9} = \frac{21\times36+14}{9}$

$= \frac{21\times36}{9} + \frac{14}{9}$

↓ Completely divisible

$\frac{14}{9}$ = 5 remainder

19.

	A	B
Income ⇒	3x	8x
− Savings ⇒	9y	25y
Exp		8x−25y

ATQ ⇒ 3x = 8x − 25y

5x = 25y

$\frac{x}{y} = \frac{5}{1}$

Income	15	:	40
Savings	9	:	25
	6	:	15

= 2 : 5 Ans

20.

Total Profit A+B = 1240000

also A−B = 248000

A's share $= \frac{1240000+248000}{2}$

= 744000

B's share $= \frac{1240000-248000}{2}$

= 496000

$\frac{A}{B} = \frac{744000}{496000} = \frac{3}{2}$

Capital Ratio = $\frac{\text{Profit Ratio}}{\text{Time Ratio}}$

	A	:	B
Prof	3	:	2
Time	4	:	3
	3/4	:	2/3

Capital Ratio = 9 : 8

↳ 1 → 600000

8 → 8×6 lacs

= 48 lacs

21.

A	B	C
14×12	10×8	9×6
	+	+
	9×2	8×2
168	98	70
84	49	35

49 → 9800

1 → 200

(84+49+35) = 168 → 168×200

= 33600 Ans

22.

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Assume total capital be = 7×5 = 35

A's share = $35 \times \frac{1}{7} = 5$

B's share = $35 \times \frac{1}{5} = 7$

C's share = 35 − (7+5) = 35 − 12 = 23

Profit Ratio = 5 : 7 : 23

Time Ratio ⇒ 5 : 7 : 9

Capital Ratio = $\frac{\text{Profit Ratio}}{\text{Time Ratio}}$

$= \frac{5}{5} : \frac{7}{7} : \frac{23}{9}$

= 9 : 9 : 23

23 → 4600

1 → 200

9 → 9×200

= 1800 Ans

23.

$x = \sqrt{\frac{128 \times 648}{10} \times \frac{}{10}} = \frac{288}{10}$

$y = \frac{57.6 \times 57.6}{38.4} = \frac{864}{10}$

$\frac{2x}{y} = \frac{2 \times \frac{288}{10}}{\frac{864}{10}} = \frac{2}{3}$

2 : 3

24.

$\frac{2x+1}{x+2} = \frac{2}{5}$

$10x + 5 = 2x + 4$

$8x = -1$

$x = -\frac{1}{8}$

Mean proportion

$\sqrt{\frac{7}{2} \times \left(1+\frac{1}{8}\right) \times 8 \times \left(1-\frac{1}{8}\right)}$

$= \sqrt{\frac{7}{2} \times \frac{9}{8} \times 8 \times \frac{7}{8}}$

$= \frac{21}{4} = 5.25$ Ans

25.

X	Y
3×5	5×5
+	+
4.5×7	2×7
46.5	39

31 : 26

(31+26) = 57 → 6.84

1 → 0.12

31 → 0.12×31

= 3.72

26.

	A	B	
Income	3x	5x	—(i)
Savings	2y	3y	

A to B = 5x = 3×(2y)

$5x = 6y$

$\frac{x}{y} = \frac{6}{5}$

Substitute x = 6 and y = 5 in (i)

	A	B
Income	18	30
− Savings	10	15
Exp →	8	15

8 : 15

27.

Old Ratio	3 : 4 : 5 ×47	
New Ratio $(\frac{1}{3}, \frac{1}{4}, \frac{1}{5})$	20 : 15 : 12 ×12	
Least Share ←	141 :	188 : 235
	240 :	180 : 144
Diff =	99 →	1188
	1 →	12

Total amt = 47×12 = 564 → 564×12 = 6768

28.

A	B
5×4	6×4
+	+
4×8	8×8
52	88

13 : 22

35 → 6.3

1 → 0.18

22 → 0.18×22

= 3.96

29.

Girls : Boys

5 : 7

+14 −14 +14 −14

$\frac{2}{5} \times 5 = 2$ | 5−2 = 3 | 7−4 = 3 | $\frac{4}{7} \times 7 = 4$

3+4 = 7 → 1120

1 → 160

12 → 1820 Ans

30.

=

19	28	55	91
↓		↓	
9		36	

1 : 4

$x = \frac{4 \times 19 - 55 \times 1}{4-1}$

$= \frac{76-55}{3} = \frac{21}{3} = 7$

x+9 = 7+9 = 16 $x^2 = 49$

Mean proportion = $\sqrt{16 \times 49}$

= 28 Ans

31.

Total Amt = (100 − 20) = 80

Denomination	2 :	5 :	10
Coin Ratio	5 :	4 :	1
Ratio of Amt	10 :	20 :	10
	1 :	2 :	1

4 → 80

1 → 20

2 → 40

No. of ₹ 5 coins = $\frac{40}{5}$ = 8 Ans

32.

Sum of 1st 8 prime numbers

2+3+5+7+11+13+17+19 = 77

Avg = $\frac{77}{8}$

Sum of 1st 10 even natural numbers = 2+4+6 20

$= \frac{10}{2}[2+20]$

$= 5 \times 22$

Avg = $\frac{5 \times 22}{10}$

Ratio = $\frac{77}{8} : \frac{5 \times 22}{10}$

= 7 : 8

33.

Fourth proportion to 12, 18 and 6

$= \frac{18 \times 6}{12} = 9$

Third proportion to k and 6 is 9

which means $\frac{6 \times 6}{k} = 9$

k = 4 Ans

34.

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24 40 33 57

16 24

2 : 3

$x = \frac{3\times24 - 33\times2}{3-2} = 6$

$\frac{5x+12}{4x+15} = \frac{6\times5+12}{4\times6+15} = \frac{42}{39} = \frac{14}{13}$

35.

A B

23 : 12

9 yrs

5 : 3

9 9

Using cross product method

$x = \frac{9\times5 - 9\times3}{23\times3 - 12\times5} = \frac{18}{9} = 2$

Ages of A & B 9 years ago

= 23×2 and 12×2

= 46 and 24

Ratio after 15 years

$= \frac{46+9+15}{24+9+15} = \frac{70}{48} = \frac{35}{24}$

36.

Third proportion to 3 and 9

$= \frac{9\times9}{3} = 27$ p = 27

Fourth proportion to 6, P, 4

= 6, 27, 4

$= \frac{27\times4}{6} = 18$

37.

	Anil	Kumud
Initial Sal	19	17
Final Sal.	8	7
	+2000	+1000

Using cross-product method

$x = \frac{1000\times8 - 7\times2000}{19\times7 - 17\times8}$

$= \frac{6000}{3} = 2000$

Kumud's salary = 17×2000

= 34000

Trick: According to the Question salary of kumad is 17X, thus final answer should be a multiple of 17.

Only one option 34000 is divisible by 17.

38.

Mean proportion $= \sqrt{\frac{12}{10}\times\frac{108}{10}}$

= 3.6

Third proportion $= \frac{1.2\times1.2}{0.2}$

= 7.2

Ratio $= \frac{3.6}{7.2} = 1:2$

39.

P	Q	R
5x	7x	8x

7x = 560

x = 80

R = 8x = 8×80 = 640

p = 5x = 5×80 = 400

40.

6300

A+D : B+C

11 : 10

3300 3000

1560 → C's share

1440 → B's share

×180

$\frac{B}{D} = \frac{8}{9}$ → 1440

×180 → 1620

A+D = 3300

− D = 1620

A = 1680

A − B = 1680 − 1440

= 240 Ans

41.

	A	B
Incomes	5	8
Expend	1	2
	−7400	−6500

Using cross-product

$x = \frac{-6500\times1 - (-7400\times2)}{5\times2 - 8\times1} = \frac{-6500+14800}{2}$

x = 4150

B's income = 8x = 8×4150

= 33200 Ans

42.

A B

5 : 7

4 (1−8/1+8 : 1−8/1+8) 4

9 : 11

4 → 16

1 → 4

Age of A & B = 5×4 and 7×4

= 20 & 28

Present Age

	A	B
	20	28
	+8	+8
	28	36

C's age = B − 13 = 36 − 13 = 23

D's age = A − 8 = 28 − 8 = 20

Sum = 43 Ans

43.

(5+7+9) = 21 → 10500

1 → 500

5	7	9
↓	↓	↓
2500	3500	4500
+ 500	500	500
3000	4000	5000

3 : 4 : 5 Ans

44.

Consider ratio of B & C only

B : C

6 : 7

3 : 4

−400 400

$x = \frac{400\times3 + 400\times4}{6\times4 - 7\times3} = \frac{2800}{3}$

A + C = (7+5)x = 12x

$= 12\times\frac{2800}{3}$

= 11200 Ans

45.

Loser : Winner Total

4 : 9 13

9 → 984321

1 → 109369

13 → 13×109369

= 1421797 Ans

46. Same as Question no. 44.

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47.

Let 'a' be the number of chemistry books ordered initially

	Physics	Chemistry	
Quantity	10	a	
Price	1	2	-(i)
Total	10	2a	

	Physics	Chemistry	
Quantity	a	10	
Price	1	2	-(ii)
Total	a	20	

ATQ $\frac{(ii)}{(i)} = \frac{7}{8} \Rightarrow \frac{a+20}{10+2a} = \frac{7}{8}$

$8a+160 = 70+14a$

$6a = 90$

$a = 15$

$\frac{\text{Physics}}{\text{Chemistry}} = \frac{10}{15} = \frac{2}{3}$ Ans

48.

Pass	Fail	Total
5	2	7
4	3	7

1 → 14

7 → 7×14

= 98 Ans

49.

Short-cut

After recruitment the ratio of males : females is 3:4

3+4 = 7. The final number of candidates should be a multiple of 7. Only one option a) 210 is divisible by 7.

Basic

$\frac{70+x}{100+x} = \frac{3}{4}$

$280+4x = 300+3x$

$x = 20$

Total $70+100+2x$

$= 170+40 = 210$ Ans

50.

4:3

3:4 | 5:6

LCM of 3 and 5 = 15

Last Year income = $4:3 \times 15$

= 60 : 45

Last Year 60 : 45

Present Year $60\times\frac{4}{3} : 45\times\frac{6}{5}$

= 80 : 54

Total present year income

(80+54) = 134 → 24.12

1 → 0.18

A's last + B's present

60 + 54 = 114x

= 114 × 0.18

= 20.52

51.

46800

A+D | B+C

8 : 5

28800 | 18000

−A 18400

D = 10400

5 → 10,000 (B)

4 → 8,000 (C)

$x = A - B = 18400 - 10,000$

= 8400

$Y = D - C = 10,400 - 8000$

= 2400

$x - Y = 8400 - 2400$

= 6000 Ans

52.

5:4

4:5 | 2:3

LCM of 4 and 2 = 4

Last Year income = $5:4 \times 4$

= 20 : 16

Last Year 20 : 16

2021's income $20\times\frac{5}{4} : 16\times\frac{3}{2}$

= 25 : 24

Total income in 2021

(25+24) = 49 → 705,600

1 → 14400

B's income = 24 → 14400 × 24

= 345600 Ans

53.

	B	C	D	E
	2	3	4	5
increased income	2.4	3.9	5.6	7.5

5.6 → 560

1 → 100

14 → 14×100

= 1400 Ans

54.

Weight	Value
1	1
2	8
3	27
5	125
	161

Original ruby's weight = 1+2+3+5

= 11

Value = $11^3 = 1331$

Loss in value = 1331 − 161

= 1170

1331 → 63888

1 → 48

1170 → 1170×48

= 56160 Ans

55.

	X	Y
Income	9	7
Expend	5	3
	16000	14000

$x = \frac{5\times14000 - 16000\times3}{9\times3 - 7\times5}$

$= \frac{22000}{8}$

Diff (9−7) = $2x = 2\times\frac{22000}{8}$

= 5500

56.

Mean proportion $\sqrt{\frac{ab}{c}\times\frac{ac}{b}}$

= a

57.

Income	7	4
Expenditure	3	1
	4800	4800

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$x = \frac{4800(3-1)}{7\times1-4\times3} = \frac{4800\times2}{5}$

$= 1920$

Sum of incomes $= 7+4 = 11x$

$= 11\times1920$

$= 21120$

58.

	Jitendra	Narendra
Income	$4x$	$7x$
Exp	$6y$	$5y$

Jitendra inc. $4x = 2800$

$x = 700$

$6y = (2800-400)$

$6y = 2400$

$y = 400$

Narendra's Savings

$= 7x - 5y = 7\times700 - 5\times400$

$= 2900$ Ans

59.

Income = Expenditure + Savings

$(3+4)7x = 12000 + x$

After adding savings to 12000 the answer should be a multiple of 7

Only 16000 will give us multiple of 7.

60.

$\frac{P}{Q+R} = \frac{4}{7\times7}$ ($\rightarrow 7+4=11$) $\quad \frac{Q}{P+R} = \frac{2\times11}{5\times11}$ ($\rightarrow 5+2=7$)

$\frac{P}{Q+R} = \frac{28}{49} \quad \frac{Q}{P+R} = \frac{22}{55}$

P	Q	R
28	22	27

$77 \rightarrow 43120$

$1 \rightarrow 560$

$27 \rightarrow 560\times27$

$= 15120$ Ans

61.

1st	2nd	3rd
2	1	3

Sum of 5 numbers $= 60\times5$

$= 300$

$-$ Sum of remaining $\frac{120}{180}$

$(3+2+1) = 6 \rightarrow 180$

$1 \rightarrow 30$

$3 \rightarrow 3\times30$

$= 90$ Ans

62.

	A	B
	4	5
	5	4
	6000	12000

$x = \frac{12000\times5 - 6000\times4}{4\times4-5\times5} = \frac{36000}{9}$

$x = 4000$

A's income

$= 4\times4000 = 16000$ Ans

63.

	P	Q
Income	$5x$	$2x$
Expendit	$9y$	$5y$

ATQ

$\frac{5x}{5y} = \frac{400}{100}$

$\frac{x}{y} = \frac{4}{1}$

P	Q
20	8
9	5
11	3

64.

	Anand	Bharath
Inc	3	5
Exp	1	3
	10000	10000

$x = \frac{10,000(3-1)}{3\times3-5\times1} = \frac{20,000}{4}$

$= 5000$

Bharath's income

$= 5\times5000 = 25000$

65.

$\frac{\text{Practical}}{\text{Theory}} = \frac{3\times80\%}{7\times60\%}$

$= \frac{240}{420} = \frac{4}{7}$

Theory : Practical

$= 7:4$

66.

Total Revenue	Central + State	80,000 + 120000 = 200000

Total expenditure $= 250000$

Deficit $= 50,000$

% of other sources $= \frac{50,000}{250000} = 20\%$

State Rev	Central	Borrowings
120000	80,000	50,000
12	8	5

$\times 0.4$

$= 4.8 : 3.2 : 2$

67.

Savings $= 15\%$.

Health : 17%.

Education : 34%.

Food : 34%.

$3x$ education $= 34\times3 = 102\%$.

ATQ $(102-100)$

$2\% \rightarrow 300$

$1\% \rightarrow 150$

$2\% \rightarrow 300$ (health-Sav)

300 Ans

68.

$\frac{a}{b} = \frac{b}{c}$

$b^2 = ac$

$b = 96$

$96^2 = ac = 9216$

In option 2 only $a\times c = 9216$

Thus possible pairs are

32 288 Ans

69.

S : R : M

2 : 7 : 12

21 : 14 : 24

$3 \rightarrow 1800$

$14 \rightarrow 8400$

70.

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$\frac{a}{b} = \frac{c}{d}$

$\frac{a}{a+35} = \frac{c}{c+60}$

$ac + 60a = ac + 35c$

$\frac{a}{c} = \frac{7x}{12x}$

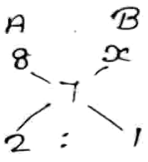
$ac = 84x^2 = 5376$

$x = 8$

$7x + 7x + 35x + 12x + 12x + 60$

$38x + 95 = 399$

71.



1 — 1

2 — 2

$x = 7 - 2$

$= 5$

72.

0	m	S
2	3	3.5
80	50	126
160	150	420

Avg $\frac{730}{850} = 2.92$

73.

S	F	
2x	3x	Salaries
3y	4y	Saving

$2x - 3y$ $3x - 4y$ Exp

$7y = 2x$

$\frac{x}{y} = \frac{7}{2}$

Exp $\frac{S}{F} = \frac{2x - 3y}{3x - 4y}$

$= \frac{8}{13}$

74.

$a : b :: c : d$

$ac = bd$

75.

$4 : 3 : 2 : 1 \longrightarrow 4 + 3 + 2 + 1 = 10$

Cost; $16 + 9 + 4 + 1 = 30$

30 — 10^2

76 — 63006

100 — 90000

76.

I $A : B : C = 2 : 9 : 3 - x$

E $A : B : C = 3 : 9 : 5 - y$

$2x - 3y = \frac{2x}{2}$

$x = 3y$

$\frac{x}{y} = \frac{3}{1}$

I	6	27	9
E	3	9	5
8	3	18	4

77.

Gold	Non Gold	
1	4	×3
2	3	×4

$5 \begin{cases} 3 : 12 \\ 8 : 12 \end{cases}$

5 — 20

$8+12 \longrightarrow 20 \times 4$

$= 80$

78. THE END.

Bruce Wayne

Mixture & Alligations

1. A vessel contains 32-litre solution of acid and water in which the ratio of acid and water is 5:3. If 12 litres of the solution are taken out and $7\frac{1}{2}$ litres of water are added to it, then what is the ratio of acid and water in the resulting solution?
(a) 4:7 (b)5:6 (c) 4:9 (d) 8:11

Tier 2, 2018 (13 Sep 2019)

2. Fresh fruit contains 68% water and dry fruit contains 20% water. How much dry fruit can be obtained from 100kg of fresh fruit?
(a) 60 (b) 80 (c) 40 (d) 20

SSC CPO 16 March 2019

3. A milkman uses three containers for selling milk, their capacities being 40L, 30L and 20L respectively. He fills respectively 87.5%, 80% and 90% of the containers with a mix of milk and water in the ratios, 3:2, 5:1 and 7:2 respectively. What is the ratio of total quantity of milk to that of water carried by him?
(a) 7:2 (b) 35:9 (c) 31:12 (d) 5:2

SSC CHSL 10 July 2019

4. A vessel contains a solution of two liquids A and B in the ratio 5:3. When 10 litres of the solution is taken out and replaced by the same quantity of B, the ratio of A and B in the vessel becomes 10:11. The quantity (in litres) of the solution in the vessel was____.
(a) 44 (b) 42 (c) 52 (d) 48

CPO 2019 (13 Dec 2019)

5. How many kg of the rice costing Rs 42 per kg should be mixed with $7\frac{1}{2}$ kg rice costing Rs 50 per kg so that by selling the mixture at Rs 53.10 per kg, there is a gain of 18%?
(a) $10\frac{1}{2}$ (b) $12\frac{1}{2}$ (c) 9 (d) 8

Tier 2, 2019 (15 Oct 2020)

6. A container contains 20L mixture in which there is 10% sulphuric acid. Find the quantity of sulphuric acid to be added in it to make the solution to contain 25% sulphuric acid.
(a) 3L (b) 4L (c) 5L (d) 2L

Tier 2, 2019 (18 Oct 2020)

7. A vessel contained a solution of acid and water in which water was 64%. Four litres of the solution was taken out of the vessel and the same quantity of water was added. If the resulting solution contains 30% acid, the quantity (in litres) of the water in the solution, at the beginning is the vessel, was :

(a) 11.36 (b)15.36 (c) 8.64 (d) 12.64

MAINS 3 Feb 2022

Q8. The ratio of milk to water in a 100 litres mixture is 2: 3. 10 litres of this mixture is withdrawn and replaced with milk. This process is repeated 2 more time. Wht is the percentage of mild in final mixture?
a) 56.25% b) 58.21%
c) 51.24% d) 54.27%

Mains 21

Q9. P and Q are two alloys of aluminium and copper. The ratios of aluminium and copper in P and Q are 5 : 11 and 3 : 5, respectively. If a third alloy is formed by mixing alloys P and Q in the ratio of 1 : 3, then aluminium is what percentage (rounded off to the nearest integer) of the copper in the third alloy?
a) 63 Percent b) 52 Percent
c) 48 Percent d) 56 Percent

CGL PRE 22

CGL MAINS 22

Q10. 40 litres of milk are kept in a container. 4 litres of milk were removed from this container and replaced with water. This procedure was performed two more times. How much milk does the container now hold?
a) 30 litres b) 34.23 litres
c) 29.16 litres d) 32 litres

CHSL PRE 22

Q11. In a mixture, milk and water are in ratio of 1 : 4. Some milk is added to the mixture because of which ratio of milk and water becomes 2 : 1. How much milk was added as a percentage of initial mixture ?
a) 400 percent b) 700 percent
c) 240 percent d) 140 percent

Q12. A milk merchant buys 30 litres of milk at the rate of Rs 50 per litre and mixes 20 litres of water in it (water is free of cost), If he sells this mixture at the rate of Rs 48 per litre, then what is the profit percentage ?
a) 40 percent b) 50 percent
c) 66.66 percent d) 60 percent

Q13. Two vessels of equal capacity contain juice and water in the ratio of 3 : 5 and 3 : 1 respectively. The mixture of both the vessels are mixed and transferred into a bigger vessel. What is the ratio of juice and water in the new mixtrure?
a) 13 : 9 b) 9 : 7 c) 8 : 9 d) 7 : 3

ICAR & Selection Phase XI

Q14. The weight of an empty fruit juice bottle is 20% of the weight of the bottle when filled with some juice in it. Some of

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the juice is drunk. Then the bottle, along with the remaining juice weighed two-fifth of the original weight. What percentage of the juice has been drunk?
1. 65% 2. 45% 3. 25% 4. 75%

Q15. 20 kg of rice costing Rs 80 per kg is mixed with y kg of rice costing Rs 100 per kg. If the cost of this mixed rice is Rs 84 per kg, what is the value of y?
1. 6 2. 5 3. 3 4. 4

CGL PRE 23

Q16. If two qualities of pulses 'X' and 'Y' of prices Rs 100 and Rs 150 per kg are mixed in the ratio 7 : 20, then what is the price (in Rs) of this mixture of pulses (correct to the nearest Rupee)?
1. 137 2. 135 3. 134 4. 136

Q17. A vessel is filled with liquid, 5 parts of which are water and 11 parts syrup. What part of the mixture must be drawn off and replaced with water so that the mixture may be syrup and water in the ratio 3 : 2?
1. $\frac{14}{45}$ 2. $\frac{27}{35}$ 3. $\frac{36}{65}$ 4. $\frac{7}{55}$

Q18. Rini has mixed two colours 'C_1' and 'C_2' in the ratio 2 : 3. If the rate of the colour 'C_1' is Rs 500 per unit and she is selling the mixture of the two colours at Rs 650 per unit at breakeven price, then what is the rate (in Rs) per unit of the second colour, that is, 'C_2' ?
1. 750 2. 725 3. 760 4. 765

CHSL PRE 23

Q19. Two jars A and B are containing the solutions of two liquids P and Q. The ratio of the liquids P and Q in the jars A and B are 2 : 19 and 1 : 11, respectively. If 7 litres of the solution of jar A and 4 litres of the solution of jar B are mixed, what is the ratio of the solutions P and Q in the new mixture?
1. 10 : 4 2. 9 : 1 3. 1 : 10 4. 1 : 9

Q20. In an experiment, it was observed that metal A is 19 times heavier than water and metal B is 9 times heavier than water. In what ratio metal A and B mixed so that the mixture thus obtained be 15 times heavier than water?
1. 3 : 1 2. 1 : 3 3. 3 : 2 4. 2 : 3

Q21. How many kilograms of rice costing Rs 52 per kg must be mixed with 35 kg of rice costing Rs 45 per kg so as to get a gain of 10% by selling the resulting mixture of rice at the rate of Rs 55 per kg?
1. 82.5 kg 2. 90.0 kg 3. 85.0 kg 4. 87.5 kg

Q22. A 10 –litre solution of milk and water contains 8 litres of milk, 2 litres of the solution is replaced by pure milk and mixed. The process is repeated two more times. How much milk (in litres) is present in the mixture so obtained?
1. 8.597 2. 8.679 3. 8.796 4. 8.976

Q23. A cask having a capacity of 600 litres is initially filled with wine. From this cask y litres of wine are first drawn and replaced with water. From this mixture, 120 litres are drawn and replaced with water. From this further diluted mixture, 120 litres are drawn again and replaced with water. The ratio of wine to water in the cask is now 12 : 13. What is the value of y?
1. 100 2. 200 3. 150 4. 125

Q24. One litre milk costs Rs 40. Water is mixed with milk and the mixture was sold at Rs 30 per litre. Find the ratio of water and milk in the mixture.
1. 1 : 3 2. 1 : 2 3. 2 : 5 4. 2 : 3

Q25. Rice worth Rs 504 per kg and Rs 540 per kg are mixed with the third variety in the ratio 1 : 1 : 2. If the mixture is worth Rs 612 per kg, find the price (per kg in Rs) of the third variety.
1. 522 2. 702 3. 630 4. 764

Q26. In a solution of water and milk, the quantity of milk is double the quantity of water. To pass the quality standards, the solution must contain 90% milk in it. If the volume of the solution is v, then how much pure milk in litres is to be added to the solution to pass the quality standard?
1. $\frac{7}{4}$v 2. $\frac{4}{3}$v 3. $\frac{3}{4}$v 4. $\frac{7}{3}$v

Q27. In two alloys, the ratio of Aluminium to Zinc are 5 : 6 and 3:5. If 242 kg of the first alloy and 144 kg of the second alloy are mixed, then the ratio of Aluminium and Zinc in the new alloy will be:
1. 93 : 100 2. 82 : 111
3. 68 : 125 4. 76 : 117

Q28. In a mixture of 178 litres, the ratio of water and milk is 5 : 7. How much water should be added to make the ratio of water and milk 3 : 4?
1. $2\frac{29}{24}$ litres 2. $2\frac{11}{24}$ litres 3. $3\frac{17}{24}$ litres 4. $3\frac{13}{24}$ litres

Q29. In a mixture, the ratio of a chemical X and water is 15 : 9. When 48 litres of this mixture is replaced with water, the ratio becomes 11 : 13. Find the quantity of water after replacement.
1. 99 litres 2. 97.5 litres 3. 92 litres 4. 102.5 litres

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CGL MAINS 23

Q30. 80 litres of a mixture of spirit and water in the ratio 7 : 9 is present in a container A. 20 litres of the mixture is transferred to another container B. Then the container A is filled with 20 litres of water. Then 32 litres of the mixture is again transferred to container B. The ratio of water to spirit of the mixture in container B is equal to:

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(a) 77 : 131 (b) 41 : 87 (c) 131 : 77 (d) 87 : 41

SELECTION PHASE XII

Q31. A person mixes two liquids, x and y. One litre of x weighs approximately 900 g, and one litre of y weighs approximately 750 g. If one litre of the mixture weighs approximately 800 g, then the percentage of x in the mixture is:

a) $33\frac{1}{3}\%$ b) 50% c) $27\frac{1}{2}\%$ d) 30%

Q32. From a container having pure milk, 40% is replaced by water and the process is repeated thrice. At the end of the third operation, the purity of milk is:

1. 21.6% 2. 22.7% 3. 18.6% 4. 23.4%

CPO 2024

Q33. In alloys A and B, the ratio of lead to tin is 5 : 3 and 3 : 1, respectively. 80 kg of alloy A and 100 kg of alloy B are mixed together to form a new alloy. What is the amount of tin (in kg) in the new alloy?

a) 90 b) 55 c) 68 d) 81.3

Q34. A drink is made by mixing water and juice in the ratio 9 : 7. If x litres of water and 2x litres of juice are mixed in 160 litres of drink, then the new ratio becomes 13 : 15. The quantity of drink (in litres) is:

a) 240 b) 280 c) 300 d) 260

CHSL 2024

Q35. How much water should be added to 60 liters of milk at $1\frac{1}{2}$ liters a rupee so as to have a mixture worth $1\frac{7}{8}$ liters a rupee ?

a) 15 liters b) 12 liters c) 27 liters d) 20 liters

CGL 2024

Q36. If one man adds 6 litres of water to 10 litres of milk and another man adds 4 litres of water to 8 litres of milk. Find the ratio of milk in the two mixtures.

a) 16 : 15 b) 12 : 11 c) 16 : 17 d) 15 : 16

Q37. The concentrations of three acids, A, B, and C, are specified as 20%, 30% and 40% respectively. They are blended in a ratio of 3 : 5 : a, yielding a solution with a concentration of 30%. What is the value of 'a'?

a) 3 b) 1 c) 2 d)

Q38. A mango juice is made by mixing water and mango concentrate in the ratio 9 : 7. If x litres of water and 3x litres of mango concentrate is mixed in 160 litres of mango juice, then the new ratio becomes 13 : 14. What is the quantity of the new mango juice (in litres)?

a) 197 b) 212 c) 206 d) 216

Q39. Half litre of a solution contains 15% of alcohol. To change the alcohol concentration to 50%, find the quantity of alcohol to be mixed.

a) 400 ml b) 350 ml c) 250 ml d) 175 ml

Answers

1	B	2	C	3	D
4	B	5	B	6	B
7	B	8	B	9	D
10	C	11	D	12	D
13	B	14	D	15	B
16	A	17	D	18	A
19	C	20	C	21	D
22	D	23	C	24	A
25	B	26	D	27	B
28	C	29	B	30	C
31	A	32	A	33	B
34	B	35	A	36	D
37	A	38	D	39	B

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1.

M-1

Acid : Water

5 : 3) −12 Litres

5 : 3 = 8 → 20

12.5 : 7.5

+7.5

12.5 : 15 = 5 : 6

M-2

$\frac{5}{8} \times \frac{20}{32} \times \frac{32}{55/2} = \frac{5}{11}$ – Acid / Total

Acid : Water

5 : 6 Ans

2.

100 kg × 32% = 80% × x kg

x = 40 kg Ans

3.

$\left(4\times\frac{7}{8}\times\frac{3}{5} + 3\times\frac{4}{5}\times\frac{5}{6} + 2\times\frac{9}{10}\times\frac{7}{9}\right)$:

$\left(4\times\frac{7}{8}\times\frac{2}{5} + 3\times\frac{4}{5}\times\frac{1}{6} + 2\times\frac{9}{10}\times\frac{2}{9}\right)$

$\frac{55}{2} : 11 = 5 : 2$

4.

A B

5 : 3) −10 litre

5 : 3 ×2

10 : 6) +5 ×2 → 10

10 : 11 (New Ratio)

21 → 42 Litre Ans

Method -2

10 : 6) 5 ×2 → 10

10 : 11

21 → 42 Litre Ans

5.

42 50

$\frac{53.10}{118} \times 100$

42 50

45

5 : 3 → 7.5 kg

12.5 kg Ans

6.

Sulphuric Acid →

10% 100%

25%

75 : 15

5 : 1

20L 4L Ans

M2 →

$\frac{75}{90} = \frac{5}{6}$ → 20 litre, 1 → 4 litre

7.

Water

64% 100%

70%

30 6

5 : 1 = 6 → 24

4

Water = $24 \times \frac{64}{100} = 15.36$ litre

259

M-2

$\frac{30}{36} = \frac{5}{6}$) 1 → 4, → 24

Water = $24 \times \frac{64}{100}$

= 15.36 Litre

8.

Water = $\frac{100}{6} \times 3$

= 60

$60 \times \left(1 - \frac{10}{100}\right)^3$

$= \frac{60 \times 729}{1000}$

= 43.74

milk = 100 − 43.74

= 56.25 %

9.

P Q

A : C A : C

5 : 11 3 : 5

$A = \frac{1}{16}\times 5 + \frac{3}{8}\times 9$

$= \frac{5}{16} + \frac{9}{8}$

$= \frac{23}{16}$

$C = \frac{1}{16}\times 11 + \frac{3}{8}\times 5$

$= \frac{41}{16}$

$A : C = \frac{23}{16} : \frac{41}{16}$

$= \frac{23}{41} \times 100$

≈ 56 %

10.

$40 \times \left(1 - \frac{4}{40}\right)^3$

$\frac{40 \times 9^3}{10^3} = \frac{40 \times 729}{1000}$

= 29.16 L

11.

m : w

1 : 4

7 [2 : 1 ×4 equal

8 : 4]

% = $\frac{7}{(1+4)} \times 100 = 140\%$

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12.

CP = 50×30 = 1500
SP = (30+20)×48 = 2400

P% = $\frac{900}{1500}$ ×100 = 60%

13.

$\frac{3}{8} + \frac{3}{4} = \frac{9}{8}$ [J]

$\frac{5}{8} + \frac{1}{4} = \frac{7}{8}$ [M]

J:M = $\frac{9}{8} : \frac{7}{8}$ ⇒ 9:7

14.

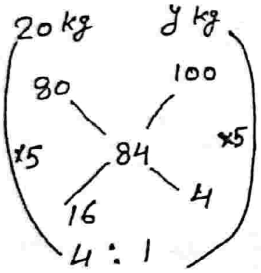
Weight of bottle + Juice = 100
" " " = 20
" " Juice ⇒ 80

100 − a = 100×$\frac{2}{5}$

a = 60

% = $\frac{60}{80}$ ×100
= 75%

15.



y = 5 kg

16.

$\frac{100\times7 + 150\times20}{7+20}$

= $\frac{700+3000}{27}$

= $\frac{3700}{27}$

≈ 137.

17.

W:S = 5:11 ×3
W:S = 2:3 ×11
= 15 : 33
+) 22 : 33 — 55
= $\frac{7}{55}$

18.

$\frac{500\times2 + x\times3}{5} = 650$

1000 + 3x = 3250
3x = 2250
x = 750

$\frac{500\times2 + x\times3}{5} = 650$

1000 + 3x = 3250
3x = 2250
x = 750

19.

P Q
A B

$\frac{7}{21}\times2 + \frac{4\times1}{12} : \frac{7}{21}\times19 + \frac{4}{12}\times11$

$\frac{2}{3} + \frac{1}{3} : \frac{19}{6} + \frac{11}{3}$

1 : 10

20.

A:W = 19:1
B:W = 9:1
A:B:W = 19:9:1

19 — 9
15
6 : 4
3 : 2

21.

x 35
52 45

$\frac{55}{110}\times100$
5 : 2
x = $\frac{35\times5}{2}$ = 87.5 kg.

22.

m : W
8 2

$2\times\frac{4}{5}\times\frac{4}{5}\times\frac{4}{5}$

= 1.024
10 − 1.024 = 8.976

23.

$\frac{120}{600} = \frac{1}{5}$; Rem $\frac{4}{5}$

Ratio of Wine and total
$\frac{(600-y)\frac{4}{5}\times\frac{4}{5}}{600} = \frac{12}{25}$

y = 150

24.

m W
40 0
30
30 : 10
3 : 1
W:m = 1:3

25.

Price of 3rd = x

① ×504 + ① ×504 + ② x = (① + ① + ③) ×612

② x = ④ × 612 − 1044
x = 702.

26.

W : m
1v : 2v
Total = 3v

$\frac{2v+x}{3v+x}$ ×100 = 90
x = 7v
$\frac{7}{3}$ v

27.

A : Z = 5:6
A : Z = 3:5

$\frac{242}{11}\times5 + \frac{144}{8}\times3$ — A

$\frac{242}{11}\times6 + \frac{144}{8}\times5$ — Z

110+54 : 132+90
164 : 222
82 : 111

28.

m = 178 × $\frac{7}{12}$
W = 178 × $\frac{5}{12}$

$\frac{178\times\frac{5}{12} + x}{178\times\frac{7}{12}} = \frac{3}{4}$

x = 3 $\frac{17}{24}$ L.

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29.

$\frac{15}{24} \times 24 = 15$

$0 \times 24 = 0$

$\frac{11}{24} \times 24 = 11$

15   0

11

11 : 4

4 — 48

11 — 132

$132 + 48 = 180$

$kl = \frac{13}{24} \times 180 = 97.5$

30.

$35 : 45$

$35 - \frac{35}{4} : 45 - \frac{45}{4}$

$21 : 43$

$\frac{32}{64} \times 21 + \frac{35}{4} : \frac{32}{64} \times 43 + 45 + 4$

$131 : 77$

31.

x   Y

900   750

800

50   100

1 : 2

$\frac{1}{3} \times 100 = 33\frac{1}{3}\%$

32.

milk = 100

$100 \times \frac{60}{100} \times \frac{60}{100} \times \frac{60}{100}$

Rem milk = 21.6

33.

	Lead	Tin	
A	5 (8)	3	
B	3 (4)	1	×2

Lead	Tin	
5	3	×~~80~~ 4
6	2	×~~100~~ 5

Lead	Tin
20	12
30	10
50	22

$\frac{Lead}{Tin} = \frac{25}{11}$

$\frac{11}{36} \times 180 = 55$

34.

90 : 70

1 : 2

13 : 15

$13 \times 2 - 13 \times 1 = 90 \times 15 - 70 \times 13$

$11 = 440$

$1 = 40$

$3 = 120$

$+160$

$280.$

35.

$\frac{2}{3}$ 0

$\frac{8}{15}$

4 : 1

$\frac{60}{4} \times 1 = 15L$

36.

$\frac{10}{16} : \frac{8}{12} = 15 : 16$

37.

$A = 2 : 8 \quad B = 3 : 7, \quad C = 4 : 6$

$\frac{6 + 15 + 4a}{24 + 35 + 6a} = \frac{3}{7}$

$147 + 28a = 177 + 18a$

$10a = 30$

$a = 3$

38.

kl	m
9	7
90	70
x	3x
13	14

$\frac{90 + x}{70 + 3x} = \frac{13}{14}$

$1260 + 14x = 910 + 39x$

$x = 14$

$160 + 4x = 216$

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39.

$500 \times \frac{15}{100} = 75ml$

$\frac{75ml + x}{500ml + x} = 0.50$

$x = 350ml$

40.

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AGE

Q1. The present ages of a mother and her son are in the ratio of 6:1. When the son becomes as old as his mother now, then the ratio of his father's age to his mother's age is 13:11. When the son becomes as old as his father now, then the sum of the ages of the father and son will be 115 years. The present age of the father is:
(a) 44 years (b) 40 years (c) 42 years (d) 45 years

Q2. The father of a girl is three years older than his mother. Six years ago, the average age of the girl and her parents was 32 years, and the age of the father was twice the present age of his daughter. What is the present age (in years) of the mother?
(a) 42 (b) 49 (c) 48 (d) 45

Q3 Jitin's age 3 years form now will be double the average of Jitin's current age and his age 8 years ago. What was Jitin's age 5 years ago ?
a) 6 years b) 11 years c) 8 years d) 7 years

Q4. The sum of the present ages of Rajini and Veena is 65 years, At present, Samantha is 5 years younger than Rajini. The respective ratio of the present ages of Samantha and Veena is 7 : 8. What would Samantha's age be after 5 years?
1. 33 years 2. 38 years 3. 28 years 4. 42 years

Q5. The present age of a husband and wife is in the ratio 5 : 4. After 6 years their ages will be in the ratio 6 : 5. At the time of their marriage the ratio of their ages was 4 : 3. In how many years ago they were married?
1. 4 years 2. 8 years 3. 10 years 4. 6 years

Q6. The average age of 6 members of a family is 25 years. If the youngest member is 4 years old, then what was the average age family just before the birth of the youngest member?
1. 27.2 years 2. 24.8 years 3. 25.2 years 4. 32.8 years

Q7. P got married 15 years ago. Today her age is $1\frac{3}{5}$ times her age at the time of her marriage. At present her son's age is $\frac{1}{5}$ of her age. What was her son's age 4 years ago as a fraction of P's age at that time?
a) $\frac{1}{9}$ b) $\frac{1}{8}$ c) $\frac{5}{9}$ d) $\frac{1}{10}$

Q8. The age of a tree depends on the number of rings in the trunk. The value of a such tree is proportional to its age. If a tree with 40 rings and 50 years of age has value of Rs 50,000, then a tree with 30 rings is _____ years of age and its value is Rs _____ .
a) 37.5, 57500 b) 37.5, 37500
c) 57.5, 57500 d) 57.5,37500

Q9. In a family, the combined age of husband, wife and a son is 90 years. The husband the oldest. The difference in the ages of the husband and wife is 1/3rd the age of their son. After 10 years, the age of the son would be half the age of his father. What is the present age of his mother (in years)?
a) 40 b) 45 c) 35 d) 30

1	B	2	D	3	A
4	A	5	D	6	C
7	A	8	B	9	C

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1.

let M : S and father = y years
6x x

Now, Mother when Son becomes 6x = 6x + 5x = 11x
Father = y + 5x

$\frac{11x}{y+5x} = \frac{11}{13} \Rightarrow \frac{x}{y} = \frac{1}{8}$

Father's age = 8x
After 7x years = 8x + 7x + 8x = 115 year
x = 5 year
8x = 40 year Ans

2.

F = M + 3 F + M + D = (32 + 6) × 3
(F − 6) = 2 × D

$\Rightarrow M + M + 3 + \frac{(M+3-6)}{2} = 38 \times 3$

$M = \frac{225}{5} =$ 45 year Ans

3.

Jitin present Age = x (Let)

$x + 3 = 2\left[\frac{x + x - 8}{2}\right]$

$x = 11$ → Present

Jitin Age 5 years ago = 6 year

4.

R + V = 65
R = 65 − V
S = 60 − V
S : V = 7 : 8

$\frac{60-V}{V} = \frac{7}{8}$ V = 32
R = 33
S = 28

After 5Y = 28 + 5 = 33

5.

∵ H : kl = 5 : 4

$\frac{5x+6}{4x+6} = \frac{6}{5}$

x = 6

Present age 30, 24

$\frac{30-k}{24-k} = \frac{4}{3}$

k = 6y

6.

25 × 6 = 150
before 4y = 150 − 6 × 4
= 126
Avg = $\frac{126}{5}$ = 25.2

7.

$(P - 15)\frac{8}{5} = P$

3P = 120
P = 40
Son = $\frac{40}{5}$ = 8
4 year ago
Son = 4
P = 36
$\frac{4}{36} = \frac{1}{9}$

8.

40 Rings — 50,000 ⇒ 50 years
30 " — 37500
years = $\frac{50}{40} \times 30$
= 37.5

9.

1 2 3

H + W + S = 90 H − W = $\frac{S}{3}$ $\frac{H+10}{2} = \frac{S+10}{2}$

From (1) & (3) H = 2S + 10 — (1)

$2S + 10 + \frac{5S}{3} + 10 + S = 90$ $6S + 30 - 3W = S$

$W = \frac{5S}{8} + 10$ — (11)

S = 15
W = 35.

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Data Interpretation

Q1. The given table shows the number of seats booked in different classes of a train on a particular day, and the numbers in brackets show the total availability of that particular class. Study the table and answer the question that follows.

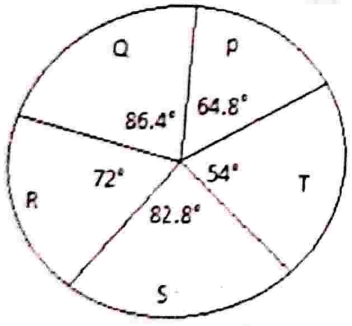
Day	2nd Class Non-Ac (900)	1st Class Non-Ac (500)	AC III Tier (500)	AC II Tier (250)	AC I Tier (150)
Monday	850	460	480	240	145
Tuesday	840	400	450	230	120
Wednesday	830	390	480	220	130
Thursday	790	480	490	250	125
Friday	840	470	500	210	130

If the data related to the vacant seats for AC 1st Class is represented by a pie-chart, then the central angle of the sector representing vacant seats for AC 1st Class for Friday is:

(a) 72° (b) 90° (c) 108° (d) 75°

Q2. Study the given pie chart and answer the question that follows.

The pie chart shows the distribution (degree-wise) of the students who appeared in the annual examination from institutes P, Q, R, S and T in 2020. The total number of students who appeared is 3000.

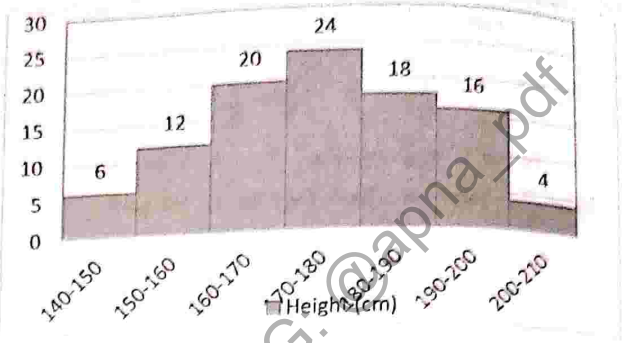


The ratio of the number of boys and girls who appeared in the examination from institutes S and T are 11 : 12 and 5 : 4, respectively. What is the difference between the total number of boys who appeared from institutes S and T and the total number of girls who appeared from these two institutes?

(a) 20 (b) 23 (c) 17 (d) 24

Q3. Study the given histogram that shows the height (in cm) of 100 students in an athletic team and answer the question that follows.

Histogram showing the height of 100 students in an athletic team.

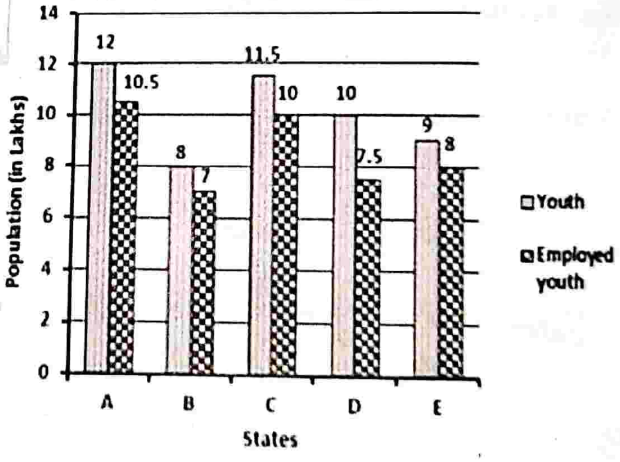


Express the number of students with height less than 170 cm as the percentage (correct to one decimal place) of the number of students with height more than 160 cm.

a) 46.3% b) 73.5% c) 29.1% d) 53.7%

Q4. The following bar graph shows the number of youth (in lakhs) and the number of employed youth (in lakhs) in 5 states A, B, C, D and E.

In which state(s) is the number of youth more than the average number of youth in the five states?



a) A b) A, C c) A, C, D, E d) A, C, D

Q5. The following bar chart shows the number of students enrolled in two Summer Camps A and B from 2014 to 2019.

Study the chart carefully and answer the question that follows.

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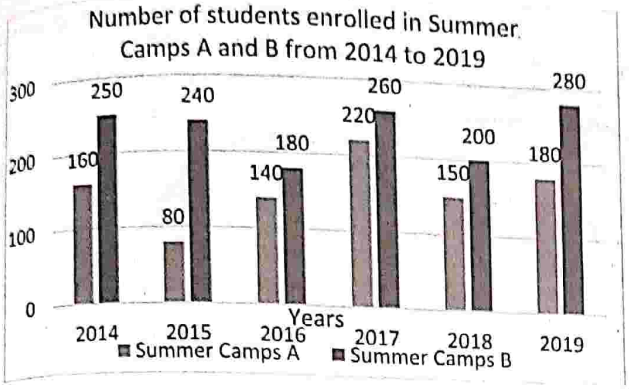
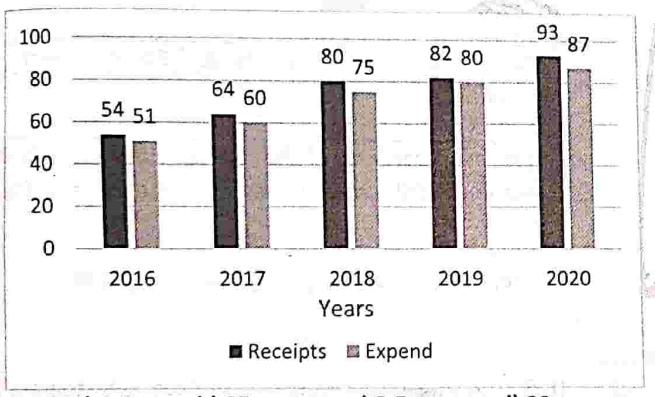


The number of students enrolled in Camp A in 2016 and 2019 together is what percentage of the number of students enrolled in Camp B in 2015 and 2017 together?

a) 64% b) 75% c) 60% d) 80%

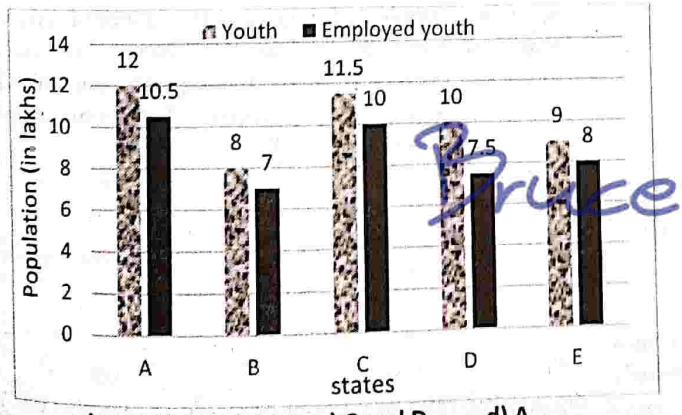
Q6. The following bar graph shows receipts and expenditure of a business firm over 5 years. Gain = Receipts – Expenditure. What is the increase percentage in receipts from 2017 to 2018?



a) 6.6 b) 25 c) 2.5 d) 20

Q7. The following bar graph shows the number of youth (in lakhs) and the number of employed youth (in lakhs) in five states A, B, C, D and E.

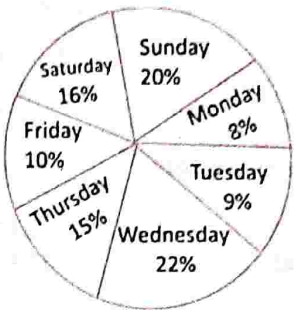
Which state(s) has employed youth less than 80% of its total youth population?



a) D b) B and D c) C and D d) A

Q8. Study the given pie-chart and answer the question that follows.

The chart represents the percentage-wise distribution of total number of vanilla cakes and chocolate cakes sold every day in a week. Total number of cakes sold in a week = 10500.

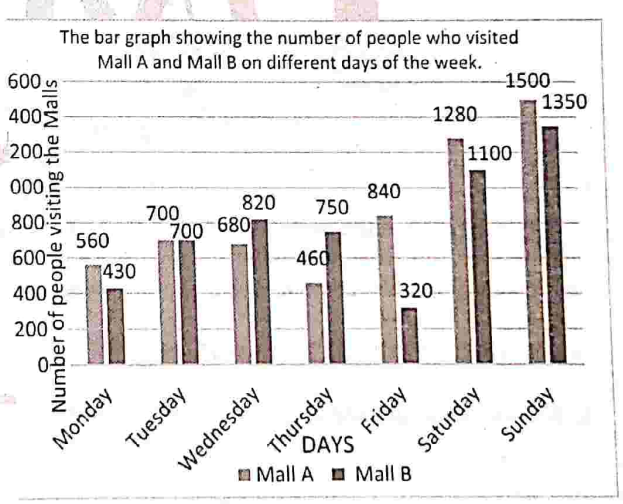


The ratio of vanilla cakes sold to chocolate cakes sold on Friday is 4 : 3. If the selling price of one vanilla cake is Rs9 and that of one chocolate cake is Rs10, then the total amount earned (in Rs) by selling all the vanilla cakes and chocolate cakes on Friday is:

a) 11,000 b) 8,900

c) 10,000 d) 9,900

Q9. The bar graph shows the number of people who visited Mall A and B on different days of a week.



The total of people visiting Mall A on Monday, Friday and Sunday is what percentage of the total number of people visiting Mall B on Tuesday, Thursday, Saturday and Sunday? Express your answer correct to one place of decimal.

a) 82.4% b) 74.35% c) 95.7% d) 86.5%

Q10. The following pie charts show the number of students studying in different departments of an institute during the academic years 2019 and 2020. The total number of students was 2000 and 2400 in academic years 2019 and 2020, respectively.

Students studying humanities in 2019 and 2020 taken together is what percentage of the total number of students studying during the two years taken together?

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Academic Year 2019

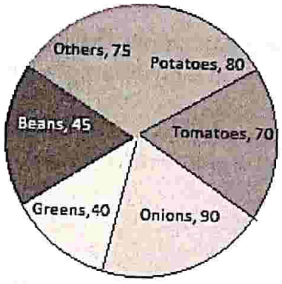
Academic Year 2020

a) 19.91%
c) 18.75%

b) 18.52%
d) 19.19%

Q11. A vegetable vendor supplies vegetables to a housing complex of 50 families. On a particular day, the break-up sale of vegetables is represented in the form of a pie chart as shown. Study the pie chart carefully and answer the question that follows.

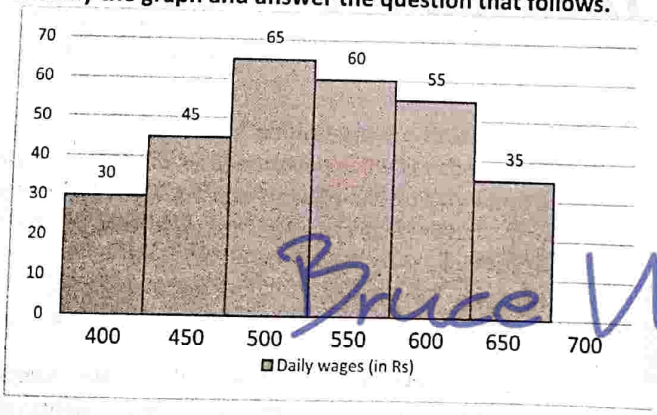
Sale of Vegetables (in kg) on a particular day in a Housing Complex of 50 families



What is the ratio of the central angle corresponding to the sale of potatoes, tomatoes and beans together to the central angle corresponding to the combined sale of onions and others?

a) 13 : 11 b) 15 : 13 c) 13 : 15 d) 11 : 13

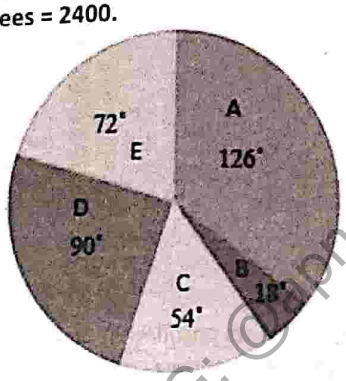
Q12. Study the graph and answer the question that follows.



What is the ratio of the number of workers whose daily wages are less than Rs450 to the total number of workers whose daily wages are Rs650 and above?

a) 3 : 5 b) 1 : 4 c) 6 : 7 d) 5 : 7

Q13. The breakup of the total number of employees of a company working in different offices (A to E), in degrees, is given in the pie chart. Total number of employees = 2400.



If the percentage of male employees in office C is 20% and that of female employees in E is 40%, then what is the ratio of the number of female employees in E to that of female employees in C?

a) 3 : 8 b) 5 : 4 c) 2 : 3 d) 3 : 2

Q14. Study the given data and answer the question that follows.

Marks	0 - 10	10-20	20-30	30-40	40-50
No of student	3	18	5	7	16

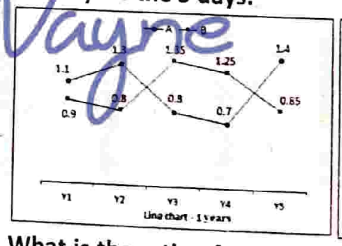
If x is the lower limit of the median class and y is the upper limit of the modal class, then the value of (3x + 2y) is:

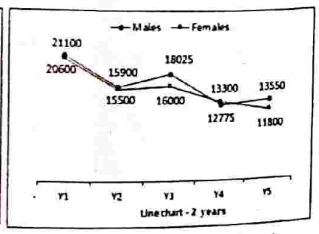
(a) 90 (b) 70 (c) 100 (d) 80

Q15. The line graph that can replace a histogram is called a/an:

1. Cumulative frequency less than type graph
2. Ogive
3. Cumulative frequency more than type graph
4. Frequency polygon

Q16. Two line charts are given below. Line chart 1 shows the ratio of number of males to the number of females in two companies A and B for the 5 years. Line chart 2 shows the total number of males (both companies A and B) and total number of females (both companies A and B) for the 5 days.





What is the ratio of number of males of company B in Y 1 to the total number of females of company A in Y3 and Y5?

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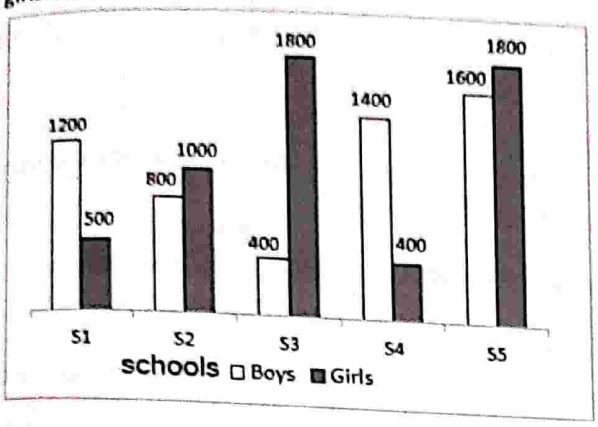
a) 129 : 215 b) 117 : 215 c) 117 : 218 d) 119 : 218

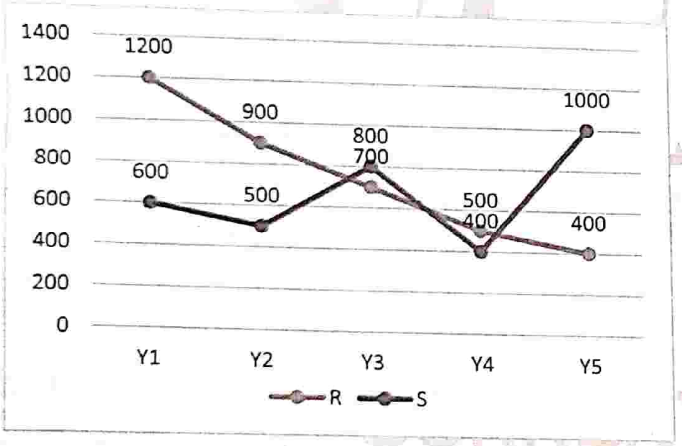
Q17. The bar chart given below shows the number of boys and girls in 5 schools.



If the number of boys in school S6 are 30 percent more than the number of girls in school, S1, then number of girls in school S3 and S4 is what percentage of number of boys in schools S6 and S1?(correct to two decimal places)

a) 124.62 b) 140.48 c) 118.92 d) 110.92

Q18. The line chart given below shows the expenditure of two companies R and S in different years.



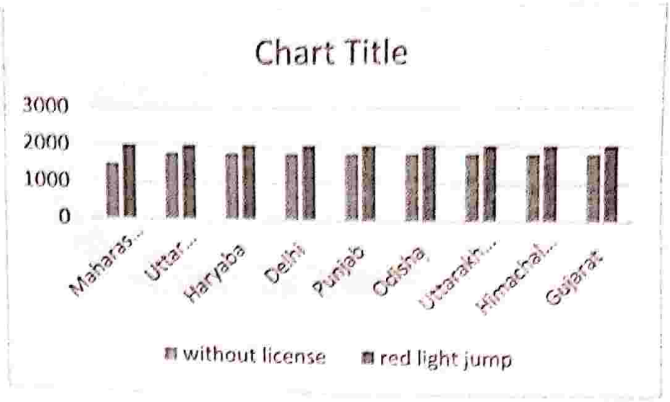
Which of the following statement is NOT correct?

1. The expenditure of R in year Y1 and Y2 together is (Approximate) 81.66 percent of the expenditure of S in year Y3 and Y4 together.
2. The total expenditure of company S is (Approximate) 112.12 percent of the total expenditure of company R.

a) Both I and II b) Only II
c) Neither I nor II d) Only II

CHSL PRE 23

Q19. The bar graph represents the number of challan in 9 states of India.



What percent is the number of challans in Maharashtra of the total number of challans with Himachal Pradesh and Odisha?

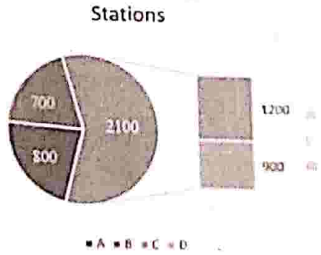
1. 400% 2. 300% 3. 280% 4. 350%

Q20. If 300 calories are burnt in every 5 km, how many calories were burnt in the whole week?

Weed Days	Distance jogged (km)
Sunday	2.5
Monday	4.0
Tuesday	2.5
Wednesday	3.5
Thursday	1.5
Friday	2.5
Saturday	1.5

1. 5400 calories 2. 1410 calories
3. 1080 calories 4. 1310 calories

Q21. The number of stations in four different cities A, B, C and D are given below.



The angles made by the cities C and D on pie chart are _____ degrees and _____ degrees, respectively.

1. 120, 90 2. 150, 70
3. 90, 120 4. 70, 150

Q22. Study the given pie-chart and table and answer the question that follows.
The pie-chart shows the percentage distribution of age groups of visitors to a park in a month.

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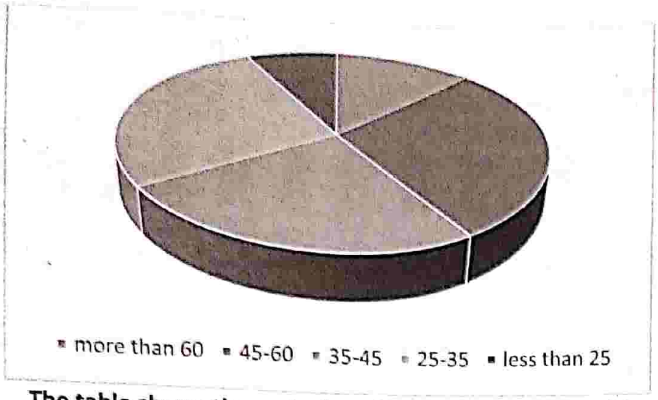


The table shows the male, female distribution of the visitors in terms of the percentage.

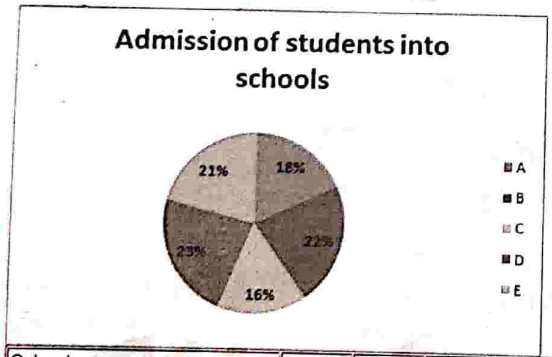
Age	Male Percentage	Female Percentage
More than 60	58	42
45-60	80	20
35-45	81	19
25-35	60	40
Less than 25	45	55

If 2000 male visitors and 1500 female visitors were there in all, then the ratio of the number of male visitors in the age group 25-35, to the female visitors of the age group 45-60 is:

1. 63 : 47 2. 71 : 45 3. 57 : 41 4. 81 : 29

SELECTION PHASE XII

Q23. The given pie-chart shows the number of students admitted into various schools, A, B, C, D, E, in a town. The total number of students is 6500. The number of boys in each school is given by the table. Study the pie-chart and the table carefully and answer the question that follows.



Schools	A	B	C	D	E
Number of boys	800	850	600	700	765

The total number of boys in schools A, C, D is what percentage of the total number of girls in schools B, C, E (rounded to 2 decimal places)?

a) 1.2863 b) 1.2963 c) 1.2082 d) 1.2062

Q24. The annual profit percentage earned by a telephone company during the period 2015 – 2020 is given in the following table. The profit percentage is calculated by the difference between income and expenditure over expenditure.

Study the table and answer the question that follows.

Year	2015	2016	2017	2018	2019	2020
Profit in percentage	40%	55%	45%	65%	70%	60%

If the income in 2018 was Rs.330 crores, then what was the expenditure in 2018 ?

a) Rs 160 crores b) Rs 200 crores

c) Rs 104 crores d) Rs 145 crores

CPO 2024

Q25. The following table shows the classification of 100 students based on the marks obtained by them in Maths and Science in an examination.

Subjects	Marks out of 100				
	80 and above	60 and above	40 and above	20 and above	0 and above
Maths	12	35	80	94	100
Science	16	43	76	88	100
Average (Aggregate)	14	39	78	91	100

What is the difference between the number of students who passed with 60 as cut-off marks in Science and those who passed with 60 as cut-off marks in aggregate?

a) 6 b) 3 c) 4 d) 5

Q26. Study the given table and answer the question that follows.

The table shows the number of students studying in 6 different classes of 6 different schools.

School	V	VI	VII	VIII	IX	X
P	152	160	145	156	147	144
Q	148	166	150	155	157	143
R	161	152	140	145	143	165
S	159	142	149	140	142	168
T	147	144	158	163	154	150
U	150	160	162	160	161	140
Total	917	924	904	919	904	910

The number of students studying in class X from school P forms approximately what percentage of the total number of students studying in class X from all schools together?

a) 8% b) 16% c) 24% d) 32%

CHSL 2024

Q27. Study the given and answer the question that follows.

The table shows the results of half-yearly and annual examination of three sections A, B, C of class X students in a school.

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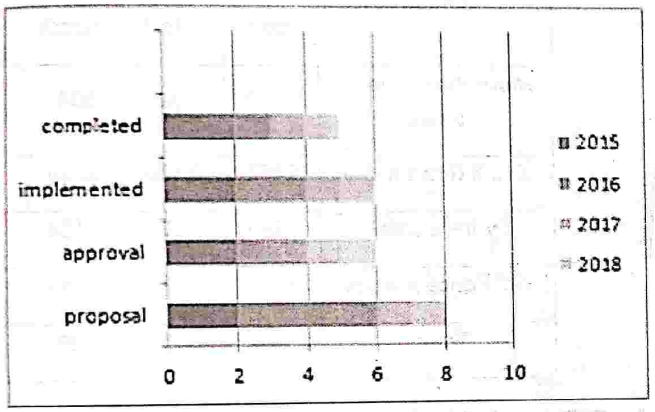
Result	Number of students		
	Section A	Section B	Section C
Students failed in both exams	39	20	12
Students failed in half-yearly but passed in annual exams	16	14	6
Students passed in half-yearly but failed in annual exams	10	12	8
Students passed in both exams	65	45	35

Find the pass percentage of section A in at least one of the two examinations:

a) 80% b) 65% c) 75% d) 70%

Q28.



A company starts constructing buildings for a college. The constructions have 4 stages.

1. buildings proposals
2. proposals approval
3. constructions implemented
4. buildings completed

The above 3D-bar graph indicates the status of constructions for 4 years 2015 to 2018.

The X-axis scale 0, 2, 4, 6,8, 10 indicates 0, 20%, 40%, 60%, 80%, 100%.

Study the bar graph carefully and answer the following question.

Find the total percentage of buildings completed during the total period, 2015 to 2018.

a) 40% b) 50% c) 30% d) 60%

Q30. The given table shows the marks obtained by 100 students out of 50 marks in Mathematics and Physics in an examination.

Marks / Subjects	40 or above	30 or above	20 or above	10 or above	0 or above
Mathematics	9	32	80	92	100
Physics	4	21	66	81	100
Average	7	27	73	87	100

If at least 60% marks in Physics are required for pursuing higher studies in Physics, how many students will be eligible to pursue higher studies in Physics?

a) 27 b) 81 c) 66 d) 21

Q31. Study the given table and answer the question that follows.

The table shows the results of half-yearly and annual examinations of three sections A, B, C of class X students in a school.

Result	Number of students		
	Section A	Section B	Section C
Students failed in both exams	39	20	12
Students failed in half-yearly but passed in annual exams	16	14	6
Students passed in half-yearly but failed in annual exams	10	12	8
Students passed in both exams	65	45	35

Find the failed percentage of section C in at least one of the two examinations.

a) 30.81% b) 10.42%

c) 38.23% d) 42.62%

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Q32. Consider the following table for total exports of goods of 5 companies over 5 years (in lakhs).

Companies / Year	R	S	T	U	V
2012	60	40	15	45	25
2013	30	60	70	15	90
2014	51	25	55	100	110
2015	45	51	20	70	65
2016	24	35	60	55	125

If the ratio of exports to the imports of companies S and U in the year 2015 is 3 : 2 and 1 : 2, respectively, then, the total imports (in lakhs) of companies S and U together in the year 2015 is:

a) 121 b) 174 c) 187 d) 157

Q33. Q162. The given table shows the expenditure (in crore ₹) of three companies A, B and C and the percentage profit of these companies in different years. Given that:

$$\text{Income} = \text{Expenditure} + \text{Expenditure} \times \frac{\text{Profit \%}}{100}$$

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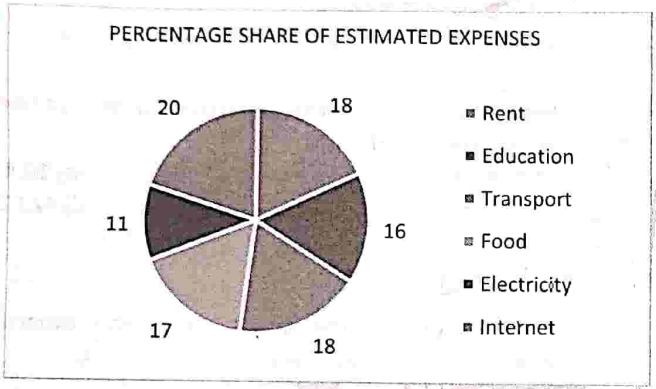
Years	Company A		Company B		Company C	
	Expenditure	Profit	Expenditure	Profit	Expenditure	Profit
2002	24	50%	20	40%	40	45%
2003	30	45%	15	25%	50	55%
2004	36	40%	25	35%	60	65%
2005	40	60%	35	48%	80	75%

What is the difference (in crore ₹) between the profits of Company A and Company B in the year 2005?

a) 12.5 b) 8.3 c) 7.2 d) 10.4

Q34. The below figure shows the estimated expenses of a family whose total estimated expenditure was Rs 2,50,000. Study the figure and answer the question that follows.



It was found that the actual expenditure on electricity was 10% more than the estimated expenditure, and the actual expenditure on rent was 20% less than estimated. All other expenses were same as that of the estimates. What was the total actual expenditure?

a) ₹2,40,750 b) ₹2,43,750

c) ₹2,48,750 d) ₹2,52,500

Q35. Study the given table and answer the question that follows.

The total money spent in advertisement (in ₹) and total number of advertisements in different newspapers given by a company for five years (2018 to 2022) is given in the below table.

Year	Total Money Spent in ₹ in Advertisement			Total No of Advertisements		
	NY times	The telegraph	Others	NY times	The telegraph	Others
2018	3,50,000	3,60,000	2,10,100	10	12	15
2019	4,80,000	3,45,000	2,89,000	12	15	17
2020	6,15,000	4,00,000	5,76,000	15	20	36
2021	7,60,000	4,80,000	4,40,000	19	24	22
2022	14,00,000	3,50,000	3,09,000	38	18	30

What is the ratio of the money spent on each of the advertisements taken one from each of NY times, The Telegraph and Others for the year 2021 to that of the money spent on each of the advertisements taken one from each of NY times, The Telegraph and Others for the year 2018?

a) 80 : 71 b) 79 : 80 c) 71 : 80 d) 80 : 79

Q36. The following table gives zone wise survey report of the people of a county who take tea. Study the table and answer the question. The ratio of the total number of people surveyed who take tea more than 3 times a day to the number of people who do not take tea at all is?

Take tea	Zone			
	East	West	North	South
More than 3 times a day	1732	1842	6045	2741
1 to 3 times a day	1462	2328	2584	4264
Twice a week	2280	2529	1123	3598
Only once a week	4059	1874	3169	7051
Never	317	127	223	293

a) 5 : 107 b) 8 : 103 c) 103 : 8 d) 101 : 5

ANSWERS

1	A	2	A	3	A
4	B	5	A	6	B
7	A	8	D	9	B
10	A	11	A	12	C
13	C	14	C	15	D
16	B	17	C	18	C
19	B	20	C	21	A
22	D	23	D	24	B
25	C	26	B	27	D
28	B	29		30	D
31	D	32	B	33	C
34	B	35	D	36	C

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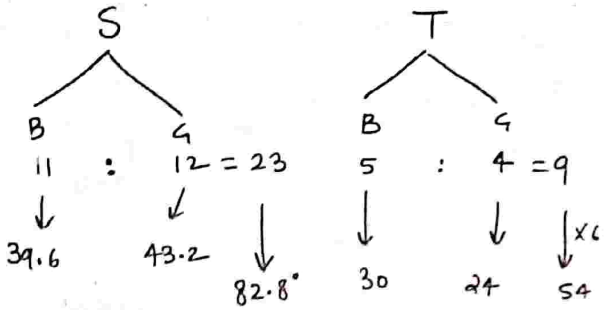
1.

$AC_1 \rightarrow 145+120+130+125+130$
$= 650$

Friday → $\frac{130}{650} \times 360 = 72°$ Ans

2.



B → 39.6 + 30 = 69.6
G → 43.2 + 24 = 67.2 → 2.4

Required difference → $\frac{3000}{360} \times 2.4 \Rightarrow 20$ Ans

3.

Height less than 170 cm → 6 + 12 + 20 = 38

Height more than 160 cm → 20 + 24 + 18 + 16 + 4 = 82

Required % ⇒ $\frac{38}{82} \times 100$ → 46.34% Ans

4.

Avg. No. of youth in the five states

⇒ $\frac{12+8+11.5+10+9}{5} = 10.1$

Now, A & C are more than the Average.

5.

Camp A (2016 & 2019) → 140 + 180 ⇒ 320

Camp B (2015 & 2017) → 240 + 260 → 500

Required % → $\frac{320}{500} \times 100 \Rightarrow 64\%$

6.

2017	2018
~~64~~	86
4	5

$+\frac{1}{4} = 25\%$ Ans

7.

D → 10 x 80% → 8 > 7.5

8.

Friday → Vanilla cake, Chocolate cake

Vanilla cake	Chocolate cake	
4	3	= 7
↓	↓	↓ 150
600	450	10500 x 10/100
Price → 9	10	= 1050
5400	+ 4500	= 9900 Ans

9.

Visiting mall A on Monday, Friday and Sunday

⇒ 560 + 840 + 1500 ⇒ 2900

Visiting mall B on Tuesday, Thursday, Saturday and Sunday →

⇒ 700 + 750 + 1100 + 1350 = 3900

Required % → $\frac{2900}{3900} \times 100 = 74.35\%$ Ans

10.

Humanities (2019) → 21% x 2000 = 420

(2020) → 19% x 2400 = 456

Required % → $\frac{(420+456)}{4400} \times 100 \Rightarrow 19.91\%$ Ans

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11.

Potatoes + tomatoes + Beans = 80+70+45 = 195

Onions & others = 90+75 = 165

Required Ratio → 195 : 165

⇒ 13 : 11 Ans

12.

Wages less than Rs 450 = 30

Wages are Rs 650 and above = 35

Required Ratio → 30 : 35

⇒ 6 : 7 Ans

13.

Female in office C → 80% of 54 = 43.2

Female in office E → 40% of 72 = 28.8

Required Ratio = 28.8 : 43.2

= 2 : 3 Ans

14.

$m = 3+18+5+7+16 = 49$

$\frac{m}{2} = 24.5$

		cf
10-10	3	3
10-20	18	21
20-30	5	26
30-40	7	33
40-50	16	49

median Class - 20-30

$x = 20$

model Class → 10-20

$y = 20$

$3x + 2y = 60+40 = 100$

15.

Frequency Polygon.

16.

A in y^1

Ratio = $\frac{11}{10}$ male = $11x$, female = $10x$

B in y^1

Ratio = $\frac{09}{10}$ male = $9y$, female = $10y$

$11x + 9y = 21100$

$10x + 10y = 20600$

$y = 780$

No of male = $9 \times 780 = 7020$ in B y^1

$289a + 176b = 138850$] A y^s

$200a + 200b = 118000$] B y^s

$a = 320$

$200a = 64000$

7020 : (6500+6400)

= 117 : 215

17.

S6 Boy

$500 \times \frac{130}{100} = 650$

$S_3 + S_4 = 1800 + 400 = 2200$

$S_6 + S_1 = 650 + 1200 = 1850$

$\% = \frac{2200}{1850} \times 100 = 118.92$

18.

R

$y_1 + y_2 = 1200 + 900 = 2100$

S

$y_3 + y_4 = 800 + 400 = 1200$

$\% = \frac{2100}{1200} \times 100 = 175\%$

I (X)

S = 600+500+800+400+1000 = 3300

R = 1200+900+700+500+400 = 3700

$\% = \frac{3300}{3700} \times 100 = 89.1$

II (X) Both I and II

19.

MH → 200+400 = 600

O → 100+300 = 400

Total = 1000

1600 + 1400 = 3000

$\% \quad \frac{3000}{1000} \times 100 = 300\%$

20.

Total = 2.5+4+2.5+3.5+1.5+2.5+1.5 = 18

5km — 300 Cal

18km — $\frac{18}{5} \times 300 = 1080$

21.

3600 — 360°

10 — 1°

1 — $\frac{1}{10}$°

C = 120°

D = 90°

22.

m	kl	Total
2000	1500	3500

$3500 \times \frac{27}{100} \times \frac{60}{100} : 3500 \times \frac{29}{100} \times \frac{20}{100}$

81 : 29

23.

Boys = 800+600+700

A+C+D = 2100

B+C+E = (22+16+21)% of 6500 (Total)

= 3835

(B+C+E) Girl's = 3835 - (850+600+767)

3835 - 2215 = 1620

$\% = \frac{2100}{1620} \times 100$

= 1.29

24.

$P\% = \frac{Inc - Exp}{Exp}$

$\frac{65}{100} = \frac{330 - x}{x}$

$x = 200$

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25.

A = 59] 4.
S = 45

26.

144 : 910
15.8 216%.

27.

Section A = 130
Failed = $\frac{39}{130} \times 100 = 30\%$

Pass atleast 1 = 100 - 30
= 70%.

28.

20 + 20 + 10
= 50

29.

NO QUESTION

30.

To pursue math > 25
Phy = 21.

31.

8 + 6 + 12 = 26
Total = 61
$\frac{26}{61} \times 100 = 42.6\%$.

32.

For S exp : Imp
3 : 2
| |
51 34

For 4 1 2
| |
70 140

140 + 34 = 174.

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33.

A's profit = 40 × 60% = 24
B's profit = 35 × 48% = 16.8
Diff = 7.2

34.

11 → 10% → 1.1
18 → 20% → 3.6
2.5%

97.5 × 256000
= 249750

35.

2021 : 2018
NY T
$\frac{760000}{19} + \frac{480000}{24} + \frac{440000}{22}$
: $\frac{350000}{10} + \frac{360000}{12} + \frac{210000}{15}$

80000 : 79000
80 : 79

36.

37 : Never
1732 + 1842 + 6045 + 2741 : 317 + 127 + 223 + 293

$\frac{12360}{960} = \frac{103}{8}$

37. The End.

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PROBABILITY

1. A bag contains Chocolate flavoured candies only. Malini takes out one candy without looking into the bag. What is the probability that she takes out an orange flavoured candy?
a. 0 (b) 1 (c) Can't determine (d) 0.5

2. It is given that in a group of 3 students, the probability of 2 students not having the same birthday is 0.99. What is the probability that the 2 students have the same birthday?
(a) 0.01 (b) 0.1 (c) 0.001 (d) Can't determine

3. A bag contains 3 red balls and 4 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is not red ?
(a) 3/7 (b) 4/7 (c) 1/7 (c) 2/7

4. A box contains 5 red marbles, 6 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will not green?
(a) 4/15 (b) 13/15 (c) 11/15 (d) 2/3

5. A box contains 5 Yellow, 4 Green and 3 white marbles. Three marbles are drawn at random. What is the probability that they are not of the same colour?
(a) 41/44 (b) 51/55 (c) 23/27 (d) 51/59

6. A Bag contains 2 green, 3 Yellow and 5 Blue balls. 2 balls are drawn at random. What is the probability that none of the balls are drawn is blue?
(a) 2/3 (b) 9/25 (c) 2/9 (d) 5/7

7. A Bag contains 8 red, 7 blue and 6 green balls. 1 ball is picked up randomly. What is the probability that it is neither red or nor green?
(a) 1/3 (b) 2/3 (c) 3/12 (d) 3/29

8. A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 and these are equally likely outcomes. What is the probability that it will point at an odd number ?
(a) 1/2 (b) 5/8 (c) 3/8 (d) 7/8

9. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting a Queen of red colour ?
(a) 1/26 (c) 1/52 (c) 1/13 (d) 3/52

10. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting a black face card ?
(a) 1/3 (b) 1/52 (c) 3/26 (d) 1/26

11. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting a jack of spade ?
(a) 1/52 (b) 3/26 (c) 1/26 (d) 3/52

12. Two cards are drawn together from a pack of 52 card. Find the Probability that one is spade and other is a heart is:
(a) 13/102 (b) 15/102 (c) 3/4 (d) 3 / 119

13. Two cards are drawn from a pack of 52 cards. Find the probability that either both are kings or both are reds?
(a) 3/28 (b) 55/221 (c) 63/221 (d) 3/29

14. A lot of 20 bulbs contain 4 defective ones. One bulb is drawn at random from the lot. Suppose the bulb drawn in is not defective and is not replaced. Now one bulb is drawn at random from the rest. What is the probability that this bulb is not defective?
(a) 1/5 (b) 4/19 (c) 15/19 (d) 16/19

15. A box contains 99 discs which are numbered from 1 to 99. If one disc is drawn at random from the box, find the probability that it bears a two digit number.
(a) 10/11 (b) 9/10 (c) 91/99 (d) 11/99

16. A box contains 99 discs which are numbered from 1 to 99. If one disc is drawn at random from the box, find the probability that it bears a perfect square ?
(a) 1/11 (b) 1/10 (c) 9/10 (d) 1/9

17. A game consists of tossing a one rupee coin 3 times and noting its outcome each time. Chandan wins if all the tosses give the same result, i.e. three heads or three tails, and loses otherwise. Calculate the probability that Chandan will lose the game.
(a) 1/4 (b) 3/4 (c) 1/3 (d) 2/3

18. A die is thrown twice. What is the probability that 6 will not come up either time?
(a) 1/6 (b) 25/36 (c) 5/6 (d) 11/36

19. A die is thrown twice. What is the probability that 6 will come up atleast once?
(a) 1/6 (b) 25/36 (c) 5/6 (d) 11/36

20. A bag contains 5 Blue balls and some red balls. If the probability of drawing a red ball is double that of a blue ball, determine the number of red balls in the bag.
(a) 5 (b) 15 (c) 10 (d) 7

21. A die is thrown, find the probability of A number greater than or equal to 3 will appear ?

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(a) 2/3 (b) 1/3 (c) 5/6 (d) 1/6

22. Two dice are tossed. The probability that the total score is a prime number is.
(a) 5/12 (b) 3/7 (c) 11/36 (d) 13/19

23. A fair coin with 1 marked on one face and 6 on the other and a fair coin are both tossed. find the probability that the sum of numbers that turn up is 3 ?
(a) 1/6 (b) 2/3 (c) 1/12 (d) 1/2

24. Three coins are tossed once. Find the probability of getting atleast 2 heads ?
(a) 1/2 (b) 7/8 (c) 1/8 (d) 3/4

25. Three coins are tossed once. Find the probability of getting atmost 2 heads ?
(a) 1/2 (b) 7/8 (c) 1/8 (d) 3/4

26. Three coins are tossed once. Find the probability of getting no heads ?
(a) 1/2 (b) 7/8 (c) 1/8 (d) 3/4

27. A letter is chosen at random from the word 'CMMENTORS'. Find the probability that letter is a vowel ?
(a) 2/9 (b) 1/3 (c) 4/9 (d) 5/9

28. In a lottery, a person choses six different natural numbers at random from 1 to 20, and if these six numbers match with the six numbers already fixed by the lottery committee, he wins the prize. What is the probability of winning the prize in the game?
(a) 1/38760 (b) 1/19380 (c) 1/9690 (d) 1/7752

29. In Class XI of a school 40% of the students study Mathematics and 30% study Biology. 20% of the class study both Mathematics and Biology. If a student is selected at random from the class, find the probability that he will be studying Mathematics or Biology.
(a) 0.1 (b) 0.2 (c) 0.5 (d) 0.3

30. In an entrance test that is graded on the basis of two examinations, the probability of a randomly chosen student passing the first examination is 0.8 and the probability of passing the second examination is 0.7. The probability of passing atleast one of them is 0.9. What is the probability of passing both?
(a) 0.1 (b) 0.2 (c) 0.6 (d) 0.3

31. In a class of 60 students, 30 opted for NCC, 30 opted for NSS and 24 opted for both NCC and NSS. If one of these students is selected at random, find the probability that The student opted for NCC or NSS.
(a) 2/9 (b) 1/3 (c) 3/5 (d) 5/9

32. In a class of 60 students, 30 opted for NCC, 30 opted for NSS and 24 opted for both NCC and NSS. If one of these students is selected at random, find the probability that The student has opted neither NCC nor NSS.
(A) 2/9 (b) 1/3 (c) 2/5 (d) 5/9

33. Find the probability that when a hand of 7 cards is drawn from a well shuffled deck of 52 cards, it contains atleast 3 Queens.
(a) 46/7735 (b) 47/7735 (c) 48/7735 (d) 49/7735

34. In a certain lottery 10,000 tickets are sold and ten equal prizes are awarded. What is the probability of not getting a prize if you buy two tickets.
(A) $\frac{9990_{C_2}}{10000_{C_2}}$ (b) $\frac{9990_{C_2}}{10000_{C_{10}}}$ (c) $\frac{9998_{C_2}}{10000_{C_{10}}}$ (d) $\frac{9998_{C_2}}{10000_{C_2}}$

35. Four persons are selected at random out of 3 men, 2 women and 4 children. The probability that there are exactly 2 children in the selection is
(A) 11/21 (b) 9/21 (c) 10/21 (d) 13/12

36. In a box there is 20 Bulbs, out of which 4 are defectives. 2 Bulbs are chosen randomly from this box. The proabability that atleast one of these bulbs is defective is?
(a) 12/19 (b) 7/19 (c) 9/19 (d) 11/19

37. Probability that A speaks truth is 3/5. A coin is tossed. A reports that a head appears. The probability that actually there was head is
(A) 2/5 (b) 1/5 (c) 3/5 (d) 2/3

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38. A glass jar contains 6 white, 8 black, 4 red and 3 blue marbles. If a single marble is chosen at random from the jar, what is the probability that it is black or blue?
(a) 8/21 (b) 11/21 (C) 5/21 (d) 1/7

39. A speaks the truth 5 out of 7 times and B speaks truth 8 out of 9 times. What is the probability that they contradict each other in stating the same fact?
(a) 1/7 (b) 1/9 (c) 1/4 (d) 1/3

40. The probabilites of solving a problem by three students A, B and C are 3/7, 5/9 and 1/5 respectively. The probability that problem that problem will be solved is:
(a) 155/315 (b) 64/315 (c) 251/315 (d) 32/315

41. A person can hit a target 5 times out of 8 shots. If he fires 10 shots, what is the probability that he will hit the target twice?
(a) $\frac{1135 \times 3^8}{8^{10}}$ (b) $\frac{1165 \times 3^8}{8^{10}}$

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(c) $\frac{1175 \times 3^8}{8^{10}}$ (d) $\frac{1125 \times 3^8}{8^{10}}$

42. The probability that a marksman will hit a target is 1 out of 5times. Then find his probability of atleast one hit in 10 shots is.
(a) $1-(4/5)^{10}$ (b) $1-(1/5)^{10}$
(c) $1-(4/5)^{1}$ (d) $1-(4/5)^{10}$

43. In grade 11 of a school, 40 students opted for Physics, 17 opted for Biology, and 20 opted for Chemistry. If the total number of students in grade 11 was 60, all of these students opted for at least one of the three subjects mentioned here, and exactly five of these students opted for all these three subjects, what is the probability that a randomly selected student of grade 11 of this school would have opted for exactly one of these three subjects?
(a) 0.75 (b) 0.85 (c) 0.90 (d) 0.80

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44. If $P(A \cup B) = \frac{5}{9}$, $P(\bar{A} \cup \bar{B}) = \frac{13}{27}$, $P(A) = \frac{11}{18}$, then the odds against the event B are: -
(a) 38/17 (b) 5/57 (c) 29/25 (d) 47/7

45. Three cards are drawn one after another with replacement from a pack of cards. What is the probability of getting first card a Jack, second card a black card, and third card an even numbered card?
(a) 5/338 (b) 25/26 (c) 5/169 (d) 20/338

ANSWERS

1	A	2	A	3	B
4	C	5	A	6	C
7	A	8	A	9	A
10	C	11	A	12	A
13	B	14	C	15	A
16	A	17	B	18	B
19	D	20	C	21	A
22	A	23	C	24	A
25	B	26	C	27	A
28	A	29	C	30	C
31	C	32	C	33	A
34	A	35	C	36	B
37	C	38	B	39	D
40	C	41	D	42	A
43	D	44	C	45	A

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1. There is no orange flavoured candy. So the probability of an orange flavoured candy is 0.
2. Probability of having the same birthday = 1-0.99 = 0.01
3. No. of red Balls = 3
   No. of Black Balls = 4
   Total number of Balls = 7,
   Probability of not Red Ball = 1-3/7 = 4/7 or simply 4/7.
4. No. of red marbles = 5
   No. of white marbles = 6
   No. of green marbles = 4
   Total no. of marbles = 15
   Probability of Not green marbles = 1-4/15 = 11/15
5.

first we will find the probability for same colour

for :-

yellow = $^5C_3$

Green = $^4C_3$

White = $^3C_3$

Prob for same colour

$$\frac{^5C_3 + {}^4C_3 + {}^3C_3}{^{12}C_3} = \frac{3}{44}$$

Prob of not of same colour

$= 1 - \frac{3}{44} = \frac{41}{44}$

6.

Total balls = 2+3+5 = 10

no of ways drawing 2 balls none of blue

$^5C_2 \rightarrow$ (2+3) balls

G Y

no of ways drawing 2 balls out of 10 $\Rightarrow {}^{10}C_2 = 45$

$$P = \frac{^5C_2}{^{10}C_2} = \frac{10}{45} = \frac{2}{9}$$

7.

Total balls = 8+7+6 = 21

no of ways drawing one ball = $^{21}C_1$

no of ways neither red nor green it means blue $\Rightarrow {}^7C_1$

$$P = \frac{^7C_1}{^{21}C_1} = \frac{7}{21} = \frac{1}{3}$$

8. Total odd number is 4 (1,3,5,7). So probability of odd numbers are 4/8 = 1/2
9. Total queen of red colour = 2. Then Probability = 2/52 = 1/26
10. Total black face card = 6. Then probability of Black face card is = 6/52 = 3/26
11. Total Jack of spade = 1. Then probability of Jack of Spade = 1/52
12.

No. of ways drawing 2 Cards from 52. $\Rightarrow {}^{52}C_2$

one is spade $\Rightarrow {}^{13}C_1$

one is Heart $\Rightarrow {}^{13}C_1$

occuring together means multiplecation

$$\frac{^{13}C_1 \times {}^{13}C_1}{^{52}C_2}$$

$$= \frac{13 \times 13}{\frac{52 \times 51 \times 50!}{50!\,2!}} = \frac{13}{102}$$

13.

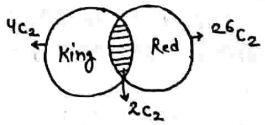
#drawing 2 Cards out of 52

no. of ways $\Rightarrow {}^{52}C_2$

drawing 2 kings out of 4

no. of ways $\Rightarrow {}^4C_2$

no. of ways drawing red card $\Rightarrow {}^{26}C_2$



$$P = \frac{^4C_2 + {}^{26}C_2 - {}^2C_2}{^{52}C_2}$$

$$= \frac{55}{221}$$

14. Bulb is not defective. So, the total bulbs are 19. Defective bulbs are 4. The probability is = 15/19.
15. Total two digit numbers are 99-9 = 90. Then probability is 90/99 = 10/11.
16. Total perfect square numbers are = 9. Then probability is 9/99 = 1/11.
17. Total outcomes are HHH, HHT, HTH, THH, TTH, THT, HTT, TTT
    There are total 8 outcomes. Chandan will lose the game if HHH or TTT will not come.
    Remaining favourable outcomes are 6.
    Then probability of chandan will lose the game = 6/8 = 3/4.
18. Total outcomes are 36.

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Outcomes of 6 are (1,6) (2,6) (3,6) (4,6) (5,6) (6,6) (6,1) (6,2) (6,3) (6,4) (6,5) = 11.
Probability of 6 will not come up either time = (36-11)/36 = 25/36

19. 6 will come up at least once?
Outcomes of 6 are (1,6) (2,6) (3,6) (4,6) (5,6) (6,6) (6,1) (6,2) (6,3) (6,4) (6,5) = 11.
Probability of 6 will come = 11/36

20.

Let Total Red balls = x
Blue balls = 5
$T_{balls} = x+5$

$P_{Blue\ Ball} = \left(\frac{5}{x+5}\right)$

$P_{Red\ Ball} = \frac{(x)}{x+5}$

A/c to Ques.

$2\left[\frac{5}{x+5}\right] = \frac{x}{x+5}$

$x^2 - 5x - 50 = 0$

$x = 10, -5$ ✗

Red balls = 10

21. Total oucomes are 3, 4, 5, 6 = 4. Then Probability is 4/6 = 2/3.

22. When 2 dice are thrown there are total 36 possibilities.
(1,1) (1,2) (1,3) (1,4) (1,5) (1,6)
(2,1) (2,2) (2,3) (2,4) (2,5) (2,6)
(3,1) (3,2) (3,3) (3,4) (3,5) (3,6)
(4,1) (4,2) (4,3) (4,4) (4,5) (4,6)
(5,1) (5,2) (5,3) (5,4) (5,5) (5,6)
(6,1) (6,2) (6,3) (6,4) (6,5) (6,6)
Favourable outcomes are (1,1) (1,2) (1,4) (1,6) (2,1) (2,3) (2,5) (3,2) (3,4) (4,1) (4,3) (5,2) (5,6) (6,1) (6,5) = 15 , Probability = 15/36 = 5/12

23. Total outcomes = (1,1) (1,2) (1,3) (1,4) (1,5) (1,6) (6,1) (6,2) (6,3) (6,4) (6,5) (6,6)
Probability that turn up is 3 i.e. (1,2) = 1/12.

24. Total outcomes are
HHH, HHT, HTH, THH, TTH, THT, HTT, TTT
Outcomes of atleast 2 heads are HHH, HHT, HTH, THH = 4
Probability = 4/8 = 1/2

25. Total outcomes are
HHH, HHT, HTH, THH, TTH, THT, HTT, TTT
Outcomes of atmost 2 heads are HHT, HTH, THH, TTH, THT, HTT, TTT = 7
Probability = 7/8

26. Total outcomes are
HHH, HHT, HTH, THH, TTH, THT, HTT, TTT
Outcomes of no head is TTT = 1.
Probability = 1/8

27. There are total 9 letters In the word CMMENTORS.
Total vowels in CMMENTORS = 2 (E,O)
Probability of vowels is 2/9.

28.

No of ways Choosing 6 no. from 1 to 20 = $^{20}C_6$
$= 38760$
winning the prize with only 1 combination out of 38760 So,
$P_{winning} = \frac{1}{38760}$

29. Students in Mathmatics = 40%
Students in Biology = 30%
Students study both Mathematics and Biology = 20%
Probability that he will be studying Mathematics of Biology = 40%+30%-20% = 50% = 50/100 = 0.5

30. Probability of passing both = 0.8+0.7-0.9 = 0.6

31. The student opted for NCC or NSS.
Probability for NCC = 30/60 = 1/2
Probability for NSS = 30/60 = 1/2
Probability for Both NCC & NSS = 24/60 = 2/5
Probability for NCC or NSS = 1/2 + 1/2 - 2/5 = 3/5

32. The student has opted neither NCC nor NSS.
Probability for NCC or NSS = 1/2 + 1/2 - 2/5 = 3/5
Probability for the student has opted neither NCC nor NSS = 1-3/5 = 2/5

33.

Total ways = $^{52}C_7 = 7735$

$P_{(atleast\ 3\ Queen)} = P_{(3\ Queen)} + P_{(4\ Q)}$

$= \frac{^{48}C_4 \times {}^4C_3 + {}^{48}C_3 \times {}^4C_4}{^{52}C_7}$

$= \frac{9}{1547} + \frac{1}{7735} = \frac{46}{7735}$

34.

no. of tickets not awarded = 10,000-10 = 9990

$P_{(not\ awarded\ a\ prize)} = \frac{^{9990}C_2}{^{10,000}C_2}$

35.

$P_{(selecting\ 4)} = {}^9C_4$

$P_{Children} = {}^4C_2$

no. of ways of other 2 from 5 $\Rightarrow {}^5C_2$

$P = \frac{{}^4C_2 \times {}^5C_2}{{}^9C_4}$

$= \frac{10}{21}$

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36.

D. Bulb = 4
G. Bulb = 16] T=20

$P_{(\text{non d. bulb})} = \frac{{}^{16}C_2}{{}^{20}C_2}$

$= \frac{12}{19}$

$P_{(\text{atleast one of these is defective})}$

$= 1 - \frac{12}{19} = \frac{7}{19}$

37. Probability when A speaks the truth = 3/5
Prbability when A Lie = 1 – 3/5 = 2/5
If a coin is tossed it either head of Tail.
The probability of getting Head is 1/2 whether A speaks truth or not.
The probability of actually there was a head is =

$\frac{\frac{3}{5}\times\frac{1}{2}}{\frac{3}{5}\times\frac{1}{2}+\frac{2}{5}\times\frac{1}{2}} = 3/5$

Mains Questions

38. Total Marbles = 6+8+4+3 = 21
Black or Blue Balls = 11
Probability of Black or Blue balls = 11/21

39. Proability that A speaks truth is 5/7.
Proablility that A speaks lie is = 2/7
Probability that B speaks truth is 8/9
Probability that B speaks lie is = 1/9
probability that they contradict each other in stating the same fact
5/7 × 1/9 + 8/9 × 2/7
= 1/3

40. Probability of not solving by A = 4/7
Probability of not solving by B = 4/9
Probability of not solving by C = 4/5
Probability that the problem is not solved = 4/7 × 4/9 × 4/5 = 64/315
Problem will be solved if any one of them solved then required probability is = 1- 64/315 = 251/315

41.

$P_{(\text{hitting target})} = 5/8$

formula = $C_K\, p^K (1-P)^{n-K}$

Total fires (n) = 10
K = exactly 2 times

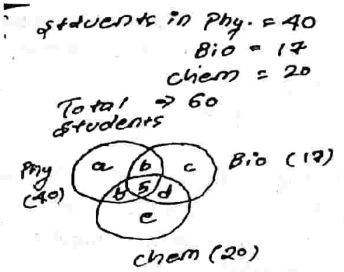
$P = {}^{10}C_2 \left(\frac{5}{8}\right)^2 \left(\frac{3}{8}\right)^{10-2}$

$= \frac{1125 \times 3^8}{8^{10}}$

42.

Here n = 10
probability of hitting a target = $\frac{1}{5}$
Required probability
⇒ if he not hit the target ⇒ $\left(\frac{4}{5}\right)^{10}$
So, at least one, target will hit
⇒ $1-\left(\frac{4}{5}\right)^{10}$

43.



A/c to ques
⇒ a+b+c+d+e+f+5=60
a+b+c+d+e+f=55 →(i)
a+b+5+f = 40
a+b+f=35 –(ii)
same b+c+d = 12–(iii)
d+e+f=15 –(iv)
Total of (ii), (iii) & (iv)
a+c+e+2(b+d+f) = 62 →(v)
multiply by 2 of eq.(i)
2(a+c+e)+2(b+d+f) = 110 –(vi)
minus eq.(v) from (vi)
⇒ a+c+e ⇒ 110–62 ⇒ 48
Probability of exactly one subject
⇒ $\frac{48}{60}$ ⇒ $\frac{8}{10}$ ⇒ 0.8

44.

$\frac{5}{9} = \frac{11}{18} + P(B) - \left(1 - \frac{13}{24}\right)$

$P(B) = \frac{25}{54}$

$P(\bar{B}) = 1 - \frac{25}{54}$

$= \frac{29}{25}$

45.

$\frac{4}{52} \times \frac{1}{2} \times \frac{20}{52}$

$= \frac{5}{338}$

46.

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Mean Median Mode

1. The points scored by a Khokho team in a series of matches are as follows:
17, 2, 7, 27, 15, 5, 14, 8, 10, 24, 48, 49, 50, 10, 8, 7, 18, 28
Find the median of the points scored by the team
(a) 12.5 (b) 14.5 (c) 12 (d) 15

2. Find the mode of the following marks (out of 10) obtained by 22 students: 4, 6, 5, 9, 3, 2, 7, 7, 6, 5, 4, 4, 9, 10, 10, 3, 4, 7, 6, 9, 9, 9
(a) 9 (b) 6 (c) 7 (d) 4

3. Consider a small unit of a factory where there are 5 employees : a supervisor and four labourers. The labourers draw a salary of 5,000 per month each while the supervisor gets 20,000 per month. Calculate the mean, median and mode of the salaries of this unit of the factory.
(a) 8000, 5000, 5000
(b) 5000, 5000, 15000
(c) 8000, 5000, 15000
(d) 5000, 15000, 20000

4. If the median of the data 30, 33, 49, 50, x, x + 2, 73, 78, 88, 96 is 63, find the value of x.
(a) 65 (b) 70 (c) 62 (d) 73

5. The marks obtained by 30 students of Class X of a certain school in a Mathematics paper consisting of 100 marks are presented in table below. Find the mean of the marks obtained by the students.

Marks Obtained	10	20	36	40	50	56	60	70	72	80	95
Number of Students	1	1	3	4	3	2	4	4	1	1	1

(a) 62.5 (b) 53.08 (c) 49.2 (d) 51.6

6. The table below gives the percentage distribution of male teachers in the primary schools of rural areas of various states and union territories (U.T.) of India. Find the mean percentage of male teachers.

Percentage of male teacher	5-15	15-25	25-35	35-45	45-55	55-65	65-75
No. of States / U.T	1	6	11	7	4	4	2

(a) 51 (b) 37.71 (c) 28 (d) 23.8

7. The following distribution shows the daily pocket allowance of children of a locality. The mean pocket allowance is Rs 19. Find the missing frequency F.

Daily Pocket allowance (in Rs.)	11-13	13-15	15-17	17-19	19-21	21-23
No. of Children	7	6	9	13	F	5

(a) 16 (b) 51 (c) 104 (d) 71

8. The wickets taken by a bowler in 10 cricket matches are as follows:

No. of wickets	0	1	2	3	4	5	6
No. of matches	1	1	2	1	3	2	2

Find the Mode of the above data?
(a) 6 (b) 4 (c) 5 (d) 2

9. A survey conducted on 20 households in a locality by a group of students resulted in the following frequency table for the number of family members in a household.

Family Size	1-3	3-5	5-7	7-9	9-11
No. of Families	6	8	2	2	1

Find mode of this data?
(a) 3.5 (b) 4.5 (c) 5.5 (d) 6.5

10. Find the median of the following data, which gives the marks, out of 50, obtained by 80 students in a test :

Marks obtained	20	29	28	33	42	38	43
No. of Students	6	28	24	15	2	4	1

(a) 35.5 (b) 31.5 (c) 30.5 (d) 39

11. Find Median of following Data?

Marks	Number of students
0-10	5
10-20	3
20-30	4
30-40	3
40-50	3
50-60	4
60-70	7
70-80	7
80-90	9
90-100	8

(a) 86.5 (b) 66.4 (c) 36.4 (d) 43.5

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12. A survey regarding the heights (in m) of 51 boys of Class X of a school was conducted and the following data was obtained:

Height (in m)	Number of Boys
Less than 135	4
Less than 140	11
Less than 145	29
Less than 150	40
Less than 155	46
Less than 160	51

Find the Median Height ?

(a) 145.14 (b) 136.45 (c) 141.25 (d) 137.5

13. The median of the following data is 525. If the total frequency is 100, Find the values of x and y,

Class Interval	Frequency
0-100	2
100-200	5
200-300	X
300-400	12
400-500	17
500-600	20
600-700	Y
700-800	4
800-900	7
900-1000	9

(a) 9, 15 (b) 10, 14 (c) 3, 21 (d)12,12

Q14. The lengths of 40 leaves of a plant are measured and the data obtained is represented in the following table:

Length	Number of Leaves
118-126	3
127-135	5
136-144	9
145-153	12
154-162	2
163-171	5
172-180	4

Find the median length of the leaves.

(a) 146.75 (b) 153.5 (c) 149.8 (d) 159.6

Q15. Find sum of Mode and Median of the given data 12, 15, 11, 18, 13, 11, 13, 13, 12

(a) 26 (b) 31 (c) 36 (d) 25

Q16. If mode = 90 and mean = 110, then the median is

(a) 200/3 (b) 310/3 (c) 290/3 (d) 20/3

Q17.Find the variance and standard deviation for the following data:

57, 64, 43, 67, 49, 9, 44, 47, 61, 59

(a) 13.8 (b) 15.8 (c) 17.8 (d) 19.8

Q18. Calculate variance, standard deviation and coefficient of variation of the following data:

Class Interval	Frequency
4-8	3
8-12	6
12-16	4
16-20	7

(a) 19, 4.35, 33.46 (b) 19, 5.35, 31.23

(c)17, 33.46, 4.35 (d) 17, 33.46, 5.35

Q19. Calculate the mean deviation about the mean of the set of first n natural numbers when n is an odd number.

(a) $\frac{n^2-1}{4n}$ (b) $\frac{n^2+1}{4n}$ (c) $\frac{n}{4}$ (d) $\frac{n^2}{4n}$

Q20. Calculate the mean deviation about the mean of the set of first n natural numbers when n is an even number.

(a) $\frac{n}{4}$ (b) $\frac{n^2}{4}$ (c) $\frac{n^3}{4}$ (d) n^2

Ans. $\frac{n}{4}$

Q21. Find the standard deviation of the first n natural numbers.

(a) $\sqrt{\frac{n^2}{12}}$ (b) $\sqrt{\frac{n^2+1}{12}}$ (c) $\sqrt{\frac{n^2-1}{12}}$ (d) $\sqrt{\frac{n^2-1}{6}}$

Answers

1	B	2	A	3	A	4	C	5	B
6	B	7	C	8	B	9	A	10	C
11	B	12	A	13	A	14	A	15	A
16	B	17	B	18	A	19	A	20	A
21	C								

Theory

$$\text{Median} = l + \frac{\frac{n}{2}-c}{f} \times h$$

where l = lower limit of the modal class,
h = size of the class interval
n= Total number of observation
f = frequency of median class
C_f =cumulative frequency of the preceding class

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

where l = lower limit of the modal class,
h = size of the class interval
f_1 = frequency of the modal class,
f_0 = frequency of the class preceding the modal class,
f_2 = frequency of the class succeeding the modal class

Standard Deviation = $\sqrt{Variance}$

Coefficient of variation = $\frac{Standard\ Deviation}{Mean} \times 100$

3 Median = Mode + 2 Mean

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1. Arranging the points scored by the team in ascending order.

2, 5, 7, 7, 8, 8, 10, 10, 14, 15, 17, 18, 24, 27, 28, 48, 49, 50

There are 18 terms. So, there are two middle terms. i.e 18/2 th and (18/2 +1)th.

So, median is the mean of 9th & 10th term.

Median = (14+15)/2 = 29/2 = 14.5

2. We arrange this data in the following form : 2, 3, 3, 4, 4, 4, 4, 5, 5, 6, 6, 6, 7, 7, 7, 9, 9, 9, 9, 9, 10, 10 Here 9 occurs most frequently, i.e., five times. So, the mode is 9.

3. Consider a small unit of a factory where there are 5 employees : a supervisor and four labourers. The labourers draw a salary of ` 5,000 per month each while the supervisor gets ` 20,000 per month. Calculate the mean, median and mode of the salaries of this unit of the factory.

Mean = $\frac{5000+5000+5000+5000+20000}{5} = \frac{40000}{5}$ = 8000

So the Mean salary is 8000 per month.

For median we arrange the series in ascending order i.e. 5000, 5000, 5000, 5000, 20000

There are total 5 observation. So Median for odd observation = (5+1)/2 = 3rd term = 5000.

Mode = Maximum often number i.e. 5000.

4. Total Observation = 10,

Median = $\frac{5th+6th}{2}$ => 63 = $\frac{X+X+2}{2}$ = X = 62.

5.

x_i	f_i	$f_i x_i$
10	1	10
20	1	20
36	3	108
40	4	160
50	3	150
56	2	112
60	4	240
70	4	280
72	1	72
80	1	80
95	1	95

Σf_i = 25, $\Sigma f_i x_i$ = 1327

mean = $\frac{\Sigma f_i x_i}{\Sigma f_i}$ = $\frac{1327}{25}$ = 53.08

6.

	f_i	x_i	$f_i x_i$
15 - 15	1	10	10
15-25	6	20	120
25-35	11	30	330
35-45	7	40	280
45-55	4	50	200
55-65	4	60	240
65-75	2	70	140
	35		1320

mean = $\frac{1320}{35}$ = 37.71

x_i = $\frac{5+15}{2}$ = 10

7.

	f_i	x_i	$f_i x_i$
11-13	7	12	84
13-15	6	14	84
15-17	9	16	144
17-19	13	18	234
19-21	F	20	20F
21-23	5	22	116
	40+F		656+20F

19 = $\frac{656+20F}{40+F}$

760 + 19F = 656 + 20F

F = 104

8. Clearly , 4 is the number of wickets taken by the bowler in the maximum number (i.e., 3) of matche. So, the mode of this data is 4.

9.

	f_i
1-3	6
3-5	8
5-7	2
7-9	2
9-11	1

Class => 3-5, Highest f_1 = 8

mode = $l + \left(\frac{f_1-f_0}{2f_1-f_0-f_2}\right) \times h$

= $3 + \left(\frac{8-6}{16-6-2}\right) \times 2$

= $3 + \frac{2 \times 2}{8}$

= 3.5

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10.

	f	cf
0	6	6
29	28	34
28	24	58
33	15	73
42	2	75
38	4	79
43	1	80
	f = 80	

$n = 80$

median = avg of $\frac{n}{2}^{th}$ and $(\frac{n}{2}+1)^{th}$ term

$= \frac{40^{th}\text{ term} + 41^{th}\text{ term}}{2}$

$Cf = 6 + 28$

$= \frac{28 + 33}{2}$

$< 40 \quad < 41$

$= \frac{61}{2}$

$= 30.5$

11.

	f	cf
0-10	5	5
10-20	3	8
20-30	4	12
30-40	3	15
40-50	3	18
50-60	4	22
60-70	7	29
70-80	7	36
80-90	9	45
90-100	8	53
	53	

$n = \frac{53}{2} = 26.5$ → greater = 29

Class — 60-70

$median = l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$

$= 60 + \left(\frac{26.5 - 22}{7}\right) \times 10$

$= 60 + \frac{45}{7}$

$= 66.4$

12.

Class	Cf	f
Below 135	4	4
135-140	11	7
140-145	29	18
145-150	40	11
150-155	46	6
155-160	51	5
	51	

$\frac{n}{2} = \frac{51}{2} = 25.5$

Class 140-145

$median = l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$

$= 140 + \left(\frac{25.5 - 7}{18}\right) \times 5$

$= 140 + \frac{92.5}{18}$

$= 145.14$

13.

	f	cf
0-100	2	2
100-200	5	7
200-300	x	7+x
300-400	12	19+x
400-500	17	36+x
500-600	20	56+x
600-700	y	56+x+y
700-800	4	60+x+y
800-900	7	67+x+y
900-1000	9	76+x+y

$76 + x + y = 100$

$x + y = 24$

median = 525

Class — 500-600

$median = l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$

$525 = 500 + \left(\frac{50 - 36 - x}{20}\right) \times 100$

$25 = (14 - x) \times 5$

$5 = 14 - x$

$x = 9$

$y = 24 - 9 \Rightarrow 15$

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Q14.

118-126	3
127-135	5
136-144	9
145-153	12
154-162	2
163-171	5
172-180	4

117.5—126.5	3	3
126.5—135.5	5	8
135.5—144.5	9	17
144.5—153.5	12	29
153.5—162.5	2	31
162.5—171.5	5	36
171.5—180.5	4	40
	40	

$\frac{n}{2} = \frac{40}{2} = 20$

Class — 144.5—153.5

$M = 144.5 + \left(\frac{20-17}{12}\right) \times 9$

$= 144.5 + \frac{3 \times 9}{12}$

$= 146.75$

Q15. Arrange the numbers in ascending order 11, 11, 12, 12, 13, 13, 13, 15, 18.

Mode (most frequent number) = 13

Median is the nth /2 observation = $(9^{th}+1)/2 = 5^{th}$ number => 13.

Sum of Mode + Median = 13+13 = 26.

Q16. 3 Median = Mode + 2 Mean

3Median = 90+2×110 = 310

Median = 310/3

Q17.

$\text{mean} = \frac{57+64+43+67+49+9+44+47+61+59}{10}$

$= \frac{500}{10} = 50$

$\text{variance } (\sigma^2) = \frac{(x_i-\bar{x})^2}{n}$

$\frac{7^2+14^2+7^2+17^2+1^2+41^2+6^2+9^2+11^2+9^2}{10} \Rightarrow 251.2$

$\sigma = \sqrt{251.2} = 15.8$

Q18. Standard Deviation = $\sqrt{Varlance}$

Coefficient of variation = $\frac{Standard\ Deviation}{Mean} \times 100$

Class	f	x_i	fx_i
4-8	3	6	18
8-12	6	10	60
12-16	4	14	56
16-20	7	18	126
	20		260

$\text{mean } \bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i} = \frac{260}{20} = 13$

$\text{Variance } (\sigma^2) = \frac{f_i(x_i-\bar{x})^2}{n}$

$= \frac{3(6-13)^2+6(10-13)^2+4(14-13)^2+7(18-13)^2}{20}$

$= \frac{147+54+4+175}{20} = \frac{380}{20}$

$= 19$

Standard Deviation

$= \sqrt{\sigma^2}$

$= \sqrt{19} = 4.35$

Coefficient of Variation

$= \frac{\text{Standard Deviation}}{\text{mean}} \times 100$

$= \frac{4.35 \times 100}{13}$

$= 33.46$

Q19. Remember the fact.

Ans: $\frac{n^2-1}{4n}$

Q20. Remember the fact.

Ans. $\frac{n}{4}$

Q21. Remember the fact.

Ans. $\sqrt{\frac{n^2-1}{12}}$

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Q14.

118-126	3
127-135	5
136-144	9
145-153	12
154-162	2
163-171	5
172-180	4

117.5—126.5	3	3
126.5—135.5	5	8
135.5—144.5	9	17
144.5—153.5	12	29
153.5—162.5	2	31
162.5—171.5	5	36
171.5—180.5	4	40
	40	

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$\sigma = \sqrt{251.2} = 15.8$

Q18. Standard Deviation = $\sqrt{Variance}$

Coefficient of variation = $\frac{Standard\ Deviation}{Mean} \times 100$

Class	f	xi	fixi
4-8	3	6	18
8-12	6	10	60
12-16	4	14	56
16-20	7	18	126
	20		260

$\text{mean } \bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i} = \frac{260}{20} = 13$

$\text{Variance } (\sigma^2) = \frac{f_i(x_i-\bar{x})^2}{f_i}$

$= \frac{3(6-13)^2+6(10-13)^2+4(14-13)^2+7(18-13)^2}{20}$

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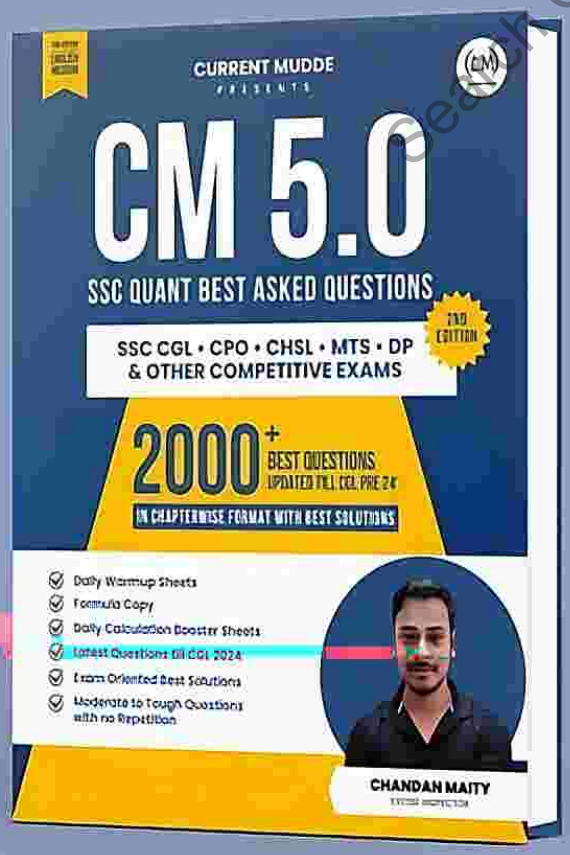

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